Householder bushfire preparation: decision-making and the implications for risk communication.

Timothy David Prior, MAppSci, BSc(Hons)

School of Psychology

University of Tasmania

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Statement of Contributions of Others

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Abstract

In order to minimise the impact of bushfire hazard consequences on the Australian community it is important to promote protective behaviours among those members of society living in at-risk locations. The adoption of protective behaviours is a core component of contemporary bushfire risk management, and is known to increase the capacity of individuals to maintain or regain prior levels of functioning following significant hazard activity. However, although considerable effort has been directed towards encouraging preparedness for bushfires in Australia, this effort has largely been unrewarded, and levels of household preparation remain low. In particular, research examining a broad range of hazards has demonstrated that neither susceptibility to a hazard and perception of risk, nor providing information about a hazard or its consequences results in a significant increase in preparation. These discontinuities point to the influence of additional motivational and interpretive (social-environmental) factors in the preparation decision, and suggest a need to move beyond examinations of the antecedents of behaviour to an exploration of the cognitive processes that bring about behaviour change. This thesis examines the decision cues that influence individual socio-cognitive processing in the decision to prepare for bushfires.

Information about people's attitudes to bushfires and bushfire preparation was obtained using 36 in-depth telephone interviews in January 2006 and between March and April 2007. Grounded theory was used to build a substantive model of bushfire preparedness decision-making. Surveys were distributed (2006/07 and 2007/08) systematically to houses within 100 metres of the bushland fringe in suburbs identified as being at risk from bushfire with assistance from local fire agencies. Quantitative data were used to validate and test the suitability of the substantive model developed from the interview data using confirmatory Structural Equation Modelling.

Results confirmed that levels of bushfire preparedness are generally low. Several cues influenced the decision to prepare, including outcome expectancy, sense of community, preparation inhibitors, collective problem solving and intentions to prepare. The substantive model of bushfire preparedness decision-making was successfully validated and tested with data from Hobart, but a poorer model fit was observed with data collected from Sydney.

Modelling the decision cues shows that individuals living in high bushfire risk areas are making a clear distinction between the decision to prepare and the decision not to prepare for bushfire, but the relative importance of the decision cues vary between communities and over time. The decision not to prepare was primarily driven by negative outcome expectancy. Positive outcome expectancy leads to strong beliefs in the value of making bushfire preparations.

The results confirmed earlier observations that traditional risk communication techniques have proved ineffective and provide a framework for the development of alternative approaches to bushfire risk communication. Because preparing and not preparing are relatively discrete processes, and because important decision cues are likely to vary between communities and over time (*e.g.* sense of community and collective problem solving), bushfire risk communication strategies must seek to accommodate this variability. The data indicate that bushfire risk communication should utilise both information provision and community engagement processes. The results support the conclusion that the adoption of these approaches will increase the likelihood that community members will take responsibility for their collective preparedness, recognise and implement the salient actions outlined in the bushfire risk communication message, and increase the level of trust in the sources of risk communication messages and the agencies that deliver them.

1. Risk Communication and Bushfire Hazard

1.1 Introduction

Bushfire in Australia is inevitable. As a natural process, it represents an essential component of the Australian ecology. However, as human settlement expands and encroaches on areas previously regarded as wilderness, fire in the bush has become one of Australia's most frequent natural hazards. Each summer, huge swathes of the Australian bush are razed by both natural and human-induced fire. While many fires burn unchecked in uninhabited areas, every year several fires burn close to human populations – threatening property and lives. In the south-eastern states, human population expansion, particularly in "peri-urban" environments, brings ever greater numbers of people into situations where bushfire can threaten their lives and livelihoods – localities where the hazardous potential of bushfire may be converted into disastrous consequences.

The peri-urban environments are at the interface between bushland and residences. Also termed the wildland-urban interface (Ewert, 1993), these are increasingly sought-after places in which to live (COAG, 2004; McLeod, 2003). Both the McLeod and COAG reports following the Canberra fires of 2003 identified specific issues in relation to living in peri-urban areas that directly influence bushfire preparation, primarily because peri-urban locations are attractive to different people for different reasons. Some people seek out lifestyles at the urban fringe that are characterised by a closeness to nature, a lifestyle choice that may contradict preparation behaviours like clearing undergrowth or trimming trees close to the house (McGee & Russell, 2003; Paton, 2006b; Paton, Bürgelt, & Prior, 2008a; Paton, Kelly, Bürgelt, & Doherty, 2006a). In other areas people choose to live in peri-urban locations because they offer cheaper living that is still relatively close to city amenities and employment. People who choose to live in the peri-urban zone for purely economic reasons may be unlikely to consider bushfire threat when making this choice (COAG, 2004; Collins, 2008; Paton*, et al.*, 2006a; Whittaker, 2008). Even if people are aware of bushfire risk, lower-income households may not have the financial capacity to undertake significant preparations around their properties, or to ensure their property is adequately insured (as was the case for

many households who lost properties in the “Black Saturday” fires of Victoria, February 2009). Most importantly, the diversity of people living in peri-urban areas poses significant difficulties for the emergency management agencies tasked with managing and mitigating bushfire risk (*e.g.* do people who choose to live in the peri-urban zone for lifestyle reasons require different information to encourage preparation than people moving there for purely economic reasons?)(COAG, 2004; McLeod, 2003).

As Australian cities and towns expand into the surrounding bushland, the extent of this peri-urban fringe also increases. Paton (2006b, p. 1) recognises that “even if the probability and intensity of bushfire hazard activity remains constant, continuing population growth and economic and infrastructure development, particularly within the peri-urban environment, results in a concomitant increase in the potential magnitude and significance of loss and disruption associated with bushfire activity”. That is, the risk is increasing at a rate that has outstripped the development of knowledgeable and prepared communities. Unfortunately, the probability of fires occurring in susceptible areas, and their intensity, is likely to increase and this shift has important implications for many communities.

Future bushfire predictions do not seem promising for Australia’s highly populace south-eastern communities (Keping & McAneney, 2005; Lucas, Hennessy, Mills, & Bathols, 2007; Nicholls & Lucas, 2007; Williams, Karoly, & Tapper, 2001). Lucas *et al.*, (2007) argue that the number of ‘extreme’ fire danger days will increase 5-25% by 2020, and 10-50% by 2050 based on current International Panel for Climate Change low-risk climate change projections. Although recent, these projections are already finding an empirical footing, suggesting that fire seasons in New South Wales, Victoria and Tasmania are beginning earlier, extending longer, and are characterised by a mix of more frequent, more intense and longer-lasting bushfires (Lucas, *et al.*, 2007; Nicholls & Lucas, 2007). However, these projections must be accurately validated.

These predictions, and the continued population expansion in the high-risk peri-urban environment highlight the need to address this growing bushfire risk. The Australian Fire Authorities Council (AFAC), the peak body responsible for fire-fighting policy in Australia and New Zealand, has established clear objectives regarding the mitigation of bushfire risk. In its “*Position Paper on Bushfires and Community Safety*” (2005, p. 4) the AFAC recognises that

while “fire agencies and some land management agencies have statutory responsibilities for managing bushfires… the steps that householders take to prepare for bushfires are crucial to the protection of their life and property”. This policy clearly identifies society’s shared role in Australian bushfire risk management, where traditional agency fire-fighting must be supported by a bushfire prepared community. But while this message is clear and widely understood at the agency level, the reality of shared bushfire risk management in our society has not fully been realised to date (Cottrell, 2005; Paton, 2006b; Paton*, et al.*, 2008a; Paton*, et al.*, 2006a; Prior & Paton, 2008; Proudley, 2008).

Bushfire emergency management agencies engage in seasonal risk communication in order to address some of these recognised deficiencies in shared bushfire preparedness, with a particular emphasis on encouraging people to become better prepared. Current risk communication processes aim to alert at-risk householders and communities about the threat of bushfire, and to inform them how to mitigate that threat: how they can be prepared. Typically, bushfire management agencies distribute information about mitigation and preparedness to all those in the community who the agency identifies as at-risk. However, considerable literature suggests that individuals do not necessarily respond to information *per se* (Ballantyne, Paton, Johnston, Kozuch, & Daly, 2000; Johnston, Bebbington, Lai, Houghton, & Paton, 1999; Johnston*, et al.*, 2005; McIvor & Paton, 2007; Paton, 2003, 2006b; Paton*, et al.*, 2008a; Paton*, et al.*, 2006a; Paton, Smith, & Johnston, 2005; Prior & Paton, 2008), but also engage interpretative and motivational processes that help them to translate this information, reflecting their circumstances and influencing their decisions about how they will respond (Paton, 2003). Australians living in the peri-urban zone are characteristically diverse. A small proportion of these people are likely to be aware of bushfire and can use the risk information they are provided with to ensure they are well-prepared. At the other end of the continuum, a similar proportion may not be aware and never use that same information (COAG, 2004; EMRS, 2007, 2008; Saunders, 1998). The remainder of those people (and possibly the largest proportion) living in peri-urban areas may be aware of their risk, and interested in acting on that awareness, but need help interpreting risk information, or respond better to different types of information. In order to encourage greater community-wide preparedness, which makes the shared responsibility of bushfire management a reality, it is

important to understand exactly how people use and respond to risk information, and to understand how people's experiences, attitudes and beliefs contribute to their decisions about bushfire preparation. To understand the importance of the shared approach to bushfire management and mitigation, it is also extremely important to recognise how people interact within their communities and within society, and how these interactions shape their understanding and behaviour.

Examining human preparedness behaviour from an holistic point of view falls within the field of community psychology (Dalton, Elias, & Wandersman, 2001; Orford, 2008). A community psychology approach is well suited to examining bushfire preparedness because bushfire affects individuals and communities in different ways than other natural hazards (Paton, 2006b; Paton*, et al.*, 2008a; Paton*, et al.*, 2006a). While all natural hazards pose threats to individuals and communities, preparations for these threats are undertaken by the household, for the household. Preparing for bushfire is unique in that one household's preparations (or lack thereof) may influence the neighbour's experience of bushfire consequences: two well-prepared neighbours may be less likely to suffer adverse consequences from bushfire activity than if only one was well-prepared – in which case the unprepared property contributes to the bushfire risk of the well-prepared property (Paton, 2006b). Similarly, home owners who are well-prepared and share interests in preparing are likely to work together to improve their ability to defend their properties (*e.g.* in the case of controlled burning) (Paton, 2006b; Paton*, et al.*, 2008a). Also, examining bushfire preparedness at the level of the community, through the lens of the individual provides an excellent means by which to understand how different community characteristics, dynamics and discourses influence the way bushfire risk is addressed in those communities (Brenkert-Smith, Champ, & Flores, 2006).

Importantly, the field of community psychology has challenged the individualistic nature of psychology, which fails to address how the social structures within a community can influence people's circumstances (and *vice versa*) (Orford, 2008). Shinn and Toohey (2003, p. 427) recognised that a failure to acknowledge the "impact of enduring neighborhood and community contexts on human behavior… has adverse consequences for understanding psychological processes and efforts at social change." The "context minimisation error", as this oversight has been termed, stresses the role of the community in forming the beliefs and

attitudes of the individual, and places considerable value in the need to enlighten the ways in which the influence of community manifests in individual behaviour, and contributes to, or hinders behaviour change (Shinn & Toohey, 2003). The authors suggest that without examining the contextual nature of human behaviour and decisions within communities, our research is conducted in a blinkered fashion that yields "impoverished theory" (Shinn & Toohey, 2003, p. 428). They also note that overlooking the complexity of social interplay, which includes between community members, and between community members and the civil structures that develop social programs and policies designed to assist society, can significantly obstruct the success of these programs or policies.

In the case of natural hazards, interactions between different levels of society (individual, community and institution) has been well shown to strongly influence individual behaviour and decision-making. For example, McIvor and Paton (2007) demonstrated the important role significant others (family, friends *etc)* played in decisions about adopting protective behaviours in response to earthquake threat in New Zealand. They point out that establishing discourse with regard to the adoption of protective measures, which targets communities, groups, families and friends, rather than the individual in isolation, will lead to sustained adoption of preparedness behaviours. Similar findings have been established in the contexts of volcanic (Dominey-Howes & Minos-Minopoulos, 2004; Gregg, Houghton, Paton, Swanson, & Johnston, 2004; Paton, Johnston, Bebbington, Lai, & Houghton, 2001a; Paton, Smith, Daly, & Johnston, 2008c), tsunami (Johnston, *et al.*, 2005), cyclone (Anderson-Berry, 2003), flooding (Grothmann & Reusswig, 2006; Siegrist & Gutscher, 2006, 2008) and bushfire hazards (Paton, 2007b; Paton*, et al.*, 2008a; Paton*, et al.*, 2006a; Prior & Paton, 2008).

Also, because of the rarity and relative unpredictability of natural hazards, and the inability to develop personal experience with hazards or their consequences, members of the public tend to attribute greater reliance on, and trust in, the sources of hazard information (Paton, 2007b, 2008b; Siegrist & Cvetkovich, 2000; Sjöberg, 1999; Van Swol & Sniezek, 2005). Paton (2007b) showed that trust in civic agencies was dependent on the availability of a hazard (see Tversky & Kahneman, 1973), particularly information about a hazard and personal familiarity with the hazard – both of which contributed to the extent of community preparedness (issues of availability, uncertainty, unpredictability and unfamiliarity associated with natural hazards

are discussed in more detail below). After a severe bushfire on the east coast of Tasmania, Prior and Paton (2008) showed that householders were often reluctant to trust the advice of fire management agencies because of past disagreements or confusion resulting from bushfire threat warnings from those agencies. Ballantyne and colleagues (2000) presented data indicating that the actions of emergency management agencies in constructing and disseminating preparedness and warning information could reduce perceptions of vulnerability by transferring responsibility to these agencies (Johnston*, et al.*, 1999; Kumagai, Bliss, Daniels, & Carroll, 2004; Paton*, et al.*, 2006a; Paton, Smith, & Johnston, 2000a). These examples demonstrate how important it is that hazard management agencies accept that the quality of their relationship with a community is as important as the information they provide. Consequently, understanding the nature of interactions between community members and civic agencies can shed light on reasons why the former may choose not to follow the advice of the latter.

In light of the importance of the influence of community and society on individual beliefs and attitudes, and of the importance of engendering more extensive bushfire preparedness among the members of at-risk communities, this thesis examines the current state of community bushfire preparedness in south-eastern Australia. It focuses particularly on elaborating the factors that influence the choice to prepare or not. To accomplish this, the thesis takes a community psychology approach to understanding people's reasoning behind bushfire preparedness: by exploring the relationships between individuals, their interactions within their communities, with civil structures, and with the wider society (Dalton, *et al.*, 2001; Orford, 2008), and how these interactions may influence preparedness reasoning. It examines the practical underpinnings of hazard preparedness, and uses this knowledge to explore the mechanisms by which preparedness may be encouraged through improved risk communication techniques.

1.1 Natural Hazards, Risk and Risk Communication

Environmental hazards like bushfire are characterised by interactions between natural and social systems (Burton, Kates, & White, 1993), with the interface between them having the potential to be harmful to people, property and the environment – they pose known risks to

our society. This potential distinguishes the hazard from a disaster, which presents the reality of that potential or threat, and the losses and disruption associated with it (Tobin & Montz, 1997). As such, the hazard is therefore the cause of a disaster, and in many cases this cause is uncontrollable. For example, Australians living in areas of high bushfire risk have no control over bushfire started during lightning storms, or even deliberately lit fires. However, while the cause of bushfires may not be controlled by the individual, their consequences can be, and distinguishing uncontrollable cause from controllable consequences has become a key component in effective risk communication (Paton*, et al.*, 2008a).

Natural hazard activity and the risk it poses to our society is probabilistic by nature (Fischhoff, Slovic, & Lichtenstein, 1982; Gardner, Cortner, & Widaman, 1987; Siegrist, 1997; Sjöberg, 1979; Slovic, 1978, 1987). Some natural hazards are rare (earthquakes or tsunamis), others are seasonal (bushfire or floods), most are partly or wholly unpredictable. Certainly, there exists no fail-safe ability or mechanism to successfully predict when natural hazards will occur, where they might occur, what intensity or consequences they may have, or how long their activity will last. However, all natural hazards can be attributed some value of likelihood.

The effect of hazard activity (or risk) is a product of the likelihood of a hazard's actual occurrence and the consequences of the incident:

$$\text{Risk} = \text{Likelihood} * \text{Consequence}$$

By this formula, natural hazards like bushfire that occur on a seasonal basis, but which may have devastating consequences whenever they occur, can be considered more risky than a "one in one hundred year" flood, which may have similar consequences. Importantly, the probabilistic (*i.e.* the likelihood of occurrence) nature of natural hazards has tended to contribute to public ignorance of the possibility of activity, or the attribution of low priority (Siegrist, 1997; Sjöberg, 2000; Slovic, 1978, 1986), which subsequently reduces the public's predisposition to mitigate the consequences of hazard activity. For example, the 1967 bushfires around Hobart (Tasmania) were referred to at the time as a "once in a lifetime" event (EMRS, 2006; Saunders, 1998). In the years following the fires, many residents of those areas affected were less likely to consider bushfire as a risk – believing that because such a severe fire had already affected them, there was little chance a repeat incident would

occur (based on feelings reflected by several participants of the current research who experienced the fires of 1967). Householders may also ignore information concerning the likelihood of bushfires because they feel that they have no influence over probabilistic messages (Fischhoff, *et al.*, 1982; Siegrist, 1997; Zakay, 1983). By contrast, because the individual can influence the consequences of bushfire (*e.g.* by being well-prepared), it is much easier to consider and evaluate the manageability of those consequences (Paton, 2006b).

Risk communication must address such circumstances as perceived low probability and the confusion between uncontrollable cause and controllable consequence. Risk communication can be used as an effective substitute where knowledge about risk and consequence may usually be obtained through experience (which is important given the infrequent nature of events), familiarity or social/familial connections, but may also provide the public with a formal source of comprehensive information that can complement their other information sources. The process of communicating to the public about risk then becomes a mechanism aimed at generating the appropriate understanding, risk acceptance and risk response (*e.g.*, mitigation, preparedness) (Grothmann & Reusswig, 2006; Mileti & O'Brien, 1993; Paton, 2003, 2006b; Paton, Smith, Johnston, Johnston, & Ronan, 2004).

One of the key goals of contemporary natural hazard risk management is the development of a resilient society (CDRSS, 2006; Paton, 2006a, 2007a; Paton, McClure, & Bürgelt, 2006b; Paton, Millar, & Johnston, 2001b; Paton, Smith, & Violanti, 2000b; Thomalla, Downing, Spanger-Siegfried, Han, & Rockström, 2006; Tobin, 1999; Tobin & Whiteford, 2002). Paton, Smith and Violanti suggest that resilience is an "active process of self-righting, learned resourcefulness and growth" (2000b, p. 173) that allows individuals to effectively and safely deal with situations (like the consequences of natural hazard activity) that are outside of their normal experiences. The resilience of individuals is a function of their vulnerability (Buckle, 1999; Paton*, et al.*, 2000b; Thomalla*, et al.*, 2006; Whittaker, 2008), or susceptibility to an adverse effect, which may be heightened by a wide variety of factors (socio-economic status, age, ethnicity, gender *etc*). In order to reduce vulnerability among those members of a society deemed to be at risk, risk management techniques must be effective and delivered efficiently in a timely and appropriate manner (Buckle, 1999). Thus, risk communication provides specialised emergency management agencies with a "targeted" means of exchanging

information aimed at informing or influencing public decision-making (Atman, Bostrom, Fischhoff, & Morgan, 1994).

Information about risk is provided to those vulnerable members of society who have the potential to be exposed to a particular risk or hazard activity, and is aimed at reducing their vulnerability and increasing their resilience to the risk they are threatened by. In this way, risk communicators target their information at an audience they feel most requires that information, which is based on the agency's experience, knowledge of the risk or hazard behaviour, and knowledge of the public's capacity to deal with that risk. So, in communicating about risks, natural hazard management agencies have dual objectives: to reduce public vulnerability to potential threats (CDRSS, 2006; Grothmann & Reusswig, 2006; Paton*, et al.*, 2000b; Thomalla*, et al.*, 2006), and to increase the resilience of the public exposed to a threat (Paton, 2006a; Paton*, et al.*, 2001a; Paton*, et al.*, 2006b; Paton*, et al.*, 2001b; Paton*, et al.*, 2000b; Tobin, 1999; Tobin & Whiteford, 2002; Vermaak & van Niekerk, 2004). Both objectives – reducing vulnerability and increasing resilience – can be achieved by promoting hazard preparedness, and this has become the fundamental goal of risk communication.

Preparation is important because it encompasses a wide variety of protective behaviours that experience has shown can contribute to reduction of vulnerability and increases in resilience to a broad variety of hazards (CDRSS, 2006; Collins, 2005; Longhurst, 1995; Paton, 2006a; Paton*, et al.*, 2001b; Paton*, et al.*, 2000b; Thomalla*, et al.*, 2006; Thomalla & Schmuck, 2004; Whittaker, 2008). In the case of bushfire, preparing may include, among many things (see table 1.1, page 17), tidying up the yard, trimming vegetation that hangs close to the house, removing leaf litter from guttering, obtaining a fuel-driven water pump and ensuring an alternative source of water from the mains is readily available. But the key benefit that preparation brings to the individual, whatever the hazard, is the ability of such action to mitigate the consequences of hazard activity. Based on the simple formula of Risk introduced earlier (page 7), minimising the consequences of a hazard through effective preparation can contribute significantly to minimising the ultimate effects of hazard activity, and increasing the ability to cope with and adapt to hazard consequences (Paton, 2006a).

However, emergency management agencies face several challenges when communicating about natural hazard risks, principally because of the uncertainty associated with the hazard

and its activity and the complex and unpredictable consequences that may result from its action. Promoting preparedness is not a simple task. For threats like crossing the road, which we encounter on a daily basis, the job is significantly easier than promoting preparedness for natural hazards. We are taught from an early age that crossing the road is dangerous, and the risk communication information we receive from our parents and elsewhere is ingrained in us during our early road-crossing experiences, and practised daily throughout our lives. Conversely, where a threat is rare and complex, when personal relevance of the threat is low (Bright & Manfredo, 1997), when it is unpredictable (Bennett, 1996; Fox & Irwin, 1998; Paoli & Bass, 1997; Powell, Dunwoody, Griffin, & Neuwirth, 2007; Sjöberg, 2007), or where people do not perceive a risk as being salient in their daily life (Paton, 2003; Tierney, Lindell, & Perry, 2001), each being the case for natural hazards, individuals are less likely to attend to, recognise the importance of, or act on risk communication information. As noted previously, the public's often pervasive inability to distinguish the controllable consequences of natural hazards from their uncontrollable causes also contributes to an individual's choice not to do anything to mitigate risk from natural hazard, instead taking a fatalistic attitude to the threat (McClure, Allen, & Walkey, 2001; McClure, Walkey, & Allen, 1999), and hoping that low probability equals never.

A large and growing body of evidence suggests that those people who receive risk information do not automatically act on it (Bord & O'Connor, 1990; Breakwell, 2000; Cottrell, 2008; Eiser, 1998; Finucane, 2002, 2008; Fischhoff, 1995; Fox & Irwin, 1998; Graffy & Booth, 2008; Grothmann & Reusswig, 2006; Jardine & Hrudey, 1997; Johnson & Slovic, 1994; Keller, Siegrist, & Gutscher, 2006; Otway & Wynne, 1989; Paton, 2003, 2008b; Prior & Paton, 2008; Slovic, 1986). While this information is directed at members of the public known to be at risk, and assumed to be cognisant of that risk, many individual, community and institutional level factors contribute to the incorporation of this information into an individual's frame of reference.

For example, most people in Australia have some awareness about bushfire threat (whether or not they live in risky areas). In many cases this awareness may extend only to a basic level, comprising some knowledge about the hazard itself and about how or where the hazard effects might occur, but less about how those effects might create consequences that can be

avoided through active mitigation (Breakwell, 2000; Eiser, 1998; Paton*, et al.*, 2006b). One of the objectives in this thesis is gaining an understanding of the way at-risk individuals make sense of bushfire risk, which is closely related to their knowledge about that risk (Breakwell, 2000). People with minimal knowledge or a basic awareness about bushfire (or any other risk) are not necessarily cognisant of risk, and therefore have less ability to place their own circumstances into a risk context that enables them to make meaning out of risk information, which permits or induces the intended actions advocated in risk messages (Breakwell, 2000; Finucane, 2002; Fisher & Chen, 1996).

Even people who do have sufficient knowledge about the consequences of risk, which might allow them to make sense of those consequences and act to mitigate them, are not necessarily going to do so (Grothmann & Reusswig, 2006; Lee, Lemyre, Mercier, Bouchard, & Krewski, 2005; McIvor & Paton, 2007; Mulilis, 1998; Paton, 2008b; Sandman, Miller, Johnson, & Weinstein, 1993; Siegrist & Gutscher, 2008). While the individual might find the risk information important enough to do something about, they may also consider that other things in their lives require more urgent attention – especially if the risk is unpredictable or unforeseeable (Eiser, 1998; Fox & Irwin, 1998; Kunruether & Pauly, 2004; Powell*, et al.*, 2007; Weinstein, 1989). So, while risk communicators pass information with the intention of changing the behaviour of an at-risk public, their efforts are not always rewarded as anticipated.

For the agencies or organisations who produce and present risk information, communicating the need to prepare is straightforward and obvious (McLeod, 2003; Ripley, 2006), but this is not necessarily the case for the public. While risk communicators completely understand the necessity for risk communication because their business is to know risk thoroughly, the public rarely shares such objective knowledge or beliefs about risk (Fischhoff, *et al.*, 1982; Slovic, 1986). A consequence of this is a poor translation of risk communication into behaviour change and greater public preparedness levels (Grothmann & Reusswig, 2006; McGee & Russell, 2003; Paton, 2003, 2006b; Paton*, et al.*, 2000a, 2005; Thomalla*, et al.*, 2006; Tierney*, et al.*, 2001).

Studies of the perception of risk have largely informed the development of risk communication (see Recchia, 1999; Slovic, 1987; Wildavsky & Dake, 1990 for reviews). Risk perception

involves a process where individuals “subjectively or intuitively comprehend, estimate and evaluate the probabilities and consequences of risks” (Krewski, Somers, & Birkwood, 1987, p. 175). Risk perception research has followed in two primary veins: psychometric examinations of the way individuals consider risk; and explorations of risk perception based on cultural influence. The former, termed psychometric theory, has concentrated on developing an understanding of how an individual views risk and is based largely on several explanatory scales that characterise risk (Fischhoff, Slovic, Lichtenstein, Read, & Combs, 1978), of which known *versus* unknown (“new-old”), “dread” and “number of exposed” have been found to be the most commonly important since the model was originally developed (Sjöberg, 2000). While popular, the psychometric model of risk perception has its detractors (who suggest its ability to describe risk perception might be a function of overlap between the psychometric measurement scales used), and considering risk perception using cultural theory provides an alternative descriptive tool (Douglas & Wildavsky, 1983).

Cultural theory specifies four types of people (egalitarian, individualist, hierachist and fatalist) who are likely to respond partly, or not at all, to different risks based on their social context and how this might govern their beliefs about those risks. It is clear that our social, cultural and political ties influence the way we think about and act on risks (Brenkert-Smith, *et al.*, 2006; CDRSS, 2006; Clarke & Short, 1993; Graffy & Booth, 2008; Hansson, 2007; Holstein & Miller, 2006; Kohler, Behrman, & Watkins, 2007; Lee, *et al.*, 2005; Lupton, 1999; Paton, 2003; Short, 1984), however the proposition that this response may be determined by a person type has received mixed empirical support (Boholm, 1996; Marris, Langford, & O'Riodan, 1998; Rippl, 2002; Sjöberg, 1998, 2000).

Whether based on individual characteristics or socio-cultural processes, our information processing about risk is affected detrimentally by biases and limitations that influence the subjective evaluation of risk and risk probabilities (Krewski, *et al.*, 1987; Lee, *et al.*, 2005; Sjöberg, 2000; Slovic, 1978, 1987; Wildavsky & Dake, 1990). A major stumbling block that research on risk perception has identified for risk communication is the overwhelming demonstration that individuals (be they expert or lay-people) perceive risk differently because of their different psychological, socio-cultural or experiential backgrounds (Barnett & Breakwell, 2001; Cox*, et al.*, 2003; Fischhoff*, et al.*, 1982; Hill & Thompson, 2006; Lee*, et al.*,

2005; Owen, Colbourne, Clayton, & Fife-Schaw, 1999; Paton, 2006a; Paton*, et al.*, 2006b; Slovic, 1986). As Slovic (1986, p. 403) identifies, the primary difficulties in risk communication are overcoming "the idiosyncrasies of the human mind" and "finding comprehensible ways of presenting complex technical material that is clouded by uncertainty, and is inherently difficult to understand". In a preparedness context, to be effective risk communicators must identify mechanisms that translate expert information and knowledge into messages or education materials that marry technical risk analysis with subjective individual thinking about risk. This means engaging an audience, who may not be receptive, with information that they find meaningful and understandable (Paton, 2006b; Paton*, et al.*, 2000a).

Risk communication techniques that are based on the perception of risk are further confounded by the recognition that perception of risk (particularly likelihood information) does not necessarily spur protective behaviour (Barnett*, et al.*, 2005; Carter-Pokras, Zambrana, Mora, & Aaby, 2007; Graffy & Booth, 2008; Miceli, Sotgiu, & Settanni, 2008; Paton, 2003; Paton*, et al.*, 2008a; Paton*, et al.*, 2001a; Paton*, et al.*, 2006a; Paton*, et al.*, 2008c; Paton*, et al.*, 2005). Recent studies (Paton, 2006b; Paton*, et al.*, 2008a; Paton*, et al.*, 2006a; Paton*, et al.*, 2008c; Paton*, et al.*, 2005) contend that while risk perception may be an antecedent of behaviour change, it does not determine the adoption of risk mitigation actions, and that socio-cognitive processes "underpin behaviour change and its maintenance over time" (Paton, 2003, p. 210). Therefore, simply providing "targeted" risk information and relying on the receiver's perception of their risk as a means to increase preparedness for natural hazards does not yield sufficient public behaviour or attitude change (Grothmann & Reusswig, 2006; Paton, 2006b; Tierney*, et al.*, 2001) and an examination of the socio-cognitive determinants of decision-making and behaviour change is necessary (Paton, 2003). Such research can help risk communicators to comprehend the reasons why individuals make the decisions they do (which may be counter-intuitive to expert advisers like bushfire Community Education Managers), and identify mechanisms that enable risk communicators to better influence this decision process and reach the objectives they seek.

Importantly, individuals do not receive information passively, but incorporate new information into a mental model (Atman*, et al.*, 1994; Bostrom, Atman, Fischhoff, & Morgan, 1994a; Fischhoff*, et al.*, 1982; Johnson-Laird, 1983; Paton*, et al.*, 2006b; Zaksek & Arvai, 2004). The

mental model is an internal representation of external reality, which encapsulates the meanings that an individual constructs to predict or explain the information, experiences or other stimuli with which they interact that is developed over time from accumulated experience (Atman, *et al.*, 1994; Bostrom, Fischhoff, & Granger Morgan, 1992; Werner & Scholz, 2002; Zaksek & Arvai, 2004). As new information comes to hand it is interpreted and sometimes integrated into this mental model, which contributes to the individual's construction of reality and is used to inform his or her decisions. People are also likely to "squeeze" new data into their existing mental models, even when that information doesn't "fit" (contradicts other information that was used in the individual's initial construction of the model) (Atman*, et al.*, 1994; Bostrom*, et al.*, 1994a; Zaksek & Arvai, 2004). Understanding the mechanisms that determine whether change in a mental model actually takes place is a challenging process (Bostrom, Morgan, Fischhoff, & Read, 1994b; Zaksek & Arvai, 2004). As such, mental models or cognitive schema play an important role in how the individual interprets and responds to risk information (Severtson, Baumann, & Brown, 2006; Zaksek & Arvai, 2004). What makes the development of useful mental models regarding natural hazard preparedness more difficult and complex is the fact that individuals rarely have direct exposure to these hazards, and must therefore rely on other mechanisms by which to inform their thinking.

Nonetheless, on first exposure to a risk consequence, or risk information, the individual makes careful consideration of their relevant options and the attendant consequences before making a decision or taking action, using this process to construct the mental model (Johnson-Laird, 1983; Zaksek & Arvai, 2004). Subsequent exposure is characterised by cognition using the already constructed mental model, which speeds up the decision-making process and saves the decision-maker's energy (Atman*, et al.*, 1994; Bostrom*, et al.*, 1992; Bostrom*, et al.*, 1994b; Werner & Scholz, 2002; Zaksek & Arvai, 2004). Using mental models in this inferential fashion can permit automatic or involuntary decision-making (Johnson-Laird, 1983). Cognitive psychologists theorise that mental models are developed as a result of the interaction of two systems: the cognitive analytic system and an intuitive experiential system (Severtson, *et al.*, 2006). Most researchers examining attitude and behaviour change agree that experiential knowledge is more personally relevant and more likely to influence the individual's mental model (Atman*, et al.*, 1994; Bostrom*, et al.*, 1992; Bostrom*, et al.*, 1994b;

Cox, *et al.*, 2003; Severtson, *et al.*, 2006; Zaksek & Arvai, 2004). While mental models are used to quickly represent the "state of affairs", they are formed piece-meal, meaning the information on which they are based may not be complete from the perspective of the expert (Bostrom, 2008; Johnson-Laird, 1983; Leventhal, Brissette, & Leventhal, 2003; Severtson, *et al.*, 2006; Wylie & Sheehy, 1999; Zaksek & Arvai, 2004), although they are adequate for the individual to make decisions. Once formed individuals are unlikely to alter their mental model unless it is challenged by new information or evidence that contradicts their current beliefs, or that can be easily incorporated into their model (Johnson-Laird, 1983).

Rather than relying on perception of risk as an instigator of action, risk communicators must design messages that contribute to the accuracy of the layperson's knowledge about risk (Severtson, *et al.*, 2006). Atman and colleagues identify the necessity for risk communicators to understand how an individual's mental model is formed, and complete it by "adding critical information and dispelling misconceptions" that may influence decision-making in the wrong way (1994, p. 779). New risk information, provided through trustworthy channels (Breakwell, 2000; Paton, 2007b, 2008b; Siegrist & Cvetkovich, 2000; Slovic, 1993; Van Swol & Sniezek, 2005), will contribute beneficially to the at-risk individual's mental model of risk and how they act to mitigate the risk's consequences (Atman, *et al.*, 1994; Bostrom, *et al.*, 1994a).

But risk communication that completes someone's mental model regarding bushfire preparation, for example, requires an understanding of how the individual has constructed that model and a deep knowledge of that person's history, their culture and background, their personality and experiences. Although the value of the "mental models approach" to risk communication development is well recognised (Atman, *et al.*, 1994; Bostrom, *et al.*, 1994a; Bostrom, *et al.*, 1992; Bostrom, *et al.*, 1994b; Cox, *et al.*, 2003; Owen, *et al.*, 1999; Zaksek & Arvai, 2004), its practical application requires more effort than many risk communicators have historically been willing to invest (Breakwell, 2000). As such, developing effective risk communication relies on a comprehensive understanding, firstly of why preparing is important, what stops people from preparing, and the social-cognitive factors that influence the choice to prepare (Arvai, Gregory, & McDaniels, 2001; Paton, 2003, 2006b; Paton, *et al.*, 2005; Paton, *et al.*, 2004; Zaksek & Arvai, 2004) and which contribute to the individual's mental model concerning hazard anticipation or response. Examining bushfire preparedness

from a socio-cognitive perspective, using a community psychology approach, can yield the type of comprehensive information necessary for developing risk communication techniques and messages that engender more widespread and comprehensive community bushfire preparedness in those areas under potential threat.

1.2 Why is Bushfire Preparation Important?

All natural disasters exact a significant impact our societies. At the very least they can cause major disruption to our lives and lifestyles. They frequently damage or destroy our property, and in the worst cases, may take many lives. The recent events of “Black Saturday” in Victoria (February, 2009) provide an all-too-real indication of the ferocity and disastrous potential of bushfire in peri-urban areas. Such hazard activity also highlights the need for society to develop or refine the mechanisms that are used to confront these hazards.

Household preparation for bushfire is one component in a whole-of-community bushfire risk management strategy that involves cooperation between home owners, emergency and land management agencies (AFAC, 2005). Shared bushfire risk management necessarily reflects the various geographical scales at which different societal members operate. For example, land management agencies (*e.g.* state national parks and forestry services) often manage large but non-contiguous parcels of land at the scale of the state. State-based metropolitan fire brigades (*e.g.* New South Wales Fire Brigades, Metropolitan Fire Brigade – Melbourne) share responsibility for bushfire management in peri-urban areas with volunteer-based bushfire brigades (*e.g.* New South Wales Rural Fire Service, Country Fire Authority – Victoria). Many of these community-based brigades serve smaller regional and rural areas. Community groups (formal and informal) may organise fire management activities on the scale of a street or neighbourhood. At the finest scale, householders play a role managing bushfire around individual properties. As noted previously, the nature of bushfire hazard as a community threat requires all sectors of society to work together effectively in order to successfully manage bushfire risk, and mitigate the possible consequences of bushfire hazard activity (Paton, 2006b), but this is not always how risk communication is viewed.

A complete bushfire risk management strategy includes separate but related structural and social features (Steelman & Kunkel, 2004). Structural features are generally more “tangible”:

vegetation and fuels management, building codes and fire-resistant building materials, land-use regulations, insurance, warning systems, public education and community preparedness. Social features involve better decision-making and management in the organisation of community and agency response activity, as well as the provision of effective support to the community when assessing and choosing structural responses, particularly in relation to preparedness and the "prepare, stay and defend or leave early" policy advocated by Australian bushfire management agencies (AFAC, 2005; Tibbits & Whittaker, 2007). Clearly, not all of these measures are under the control of, or available to the householder, yet well-prepared householders must consider how many of these bushfire management components may impact on their lifestyles and their ability to live safely in bushfire risk areas.

In communities where bushfire risk is high, household preparation is a key element contributing to household bushfire management strategy (Paton, 2006b; Paton*, et al.*, 2008a; Paton & Wright, 2008), and the community's ability to mitigate bushfire threat. Preparing comprises a great variety of actions, which are detailed in Table 1.1 (below) and include the creation of a defendable space, clearing gutters, ensuring an alternative water supply, actively managing vegetation around the house, placing metal fly screens on windows, obtaining equipment (hoses, pumps, buckets, ladders) to extinguish spot fires, and planning how the household should respond in the case of bushfire threat.

Table 1.1. Structural, planning and survival bushfire preparations suggested by bushfire management agencies (bushfire preparedness scale from Paton *et al.*, 2006).

Structural	Planning	Survival
1. Clear dry litter	1. Know the risk	1. Have an emergency kit prepared that contains:
2. Clean gutters	2. Assess the risk to the house	Torches
3. Remove trees/shrubs from against the house	3. Understand how bushfire attacks	AM/FM battery-powered radio
4. Stack firewood away from house	4. Make a bushfire plan	Spare batteries
5. Have long hoses	5. Let others know what the plan is	Candles
6. Metal buckets	6. Choose whether to stay or go, and who should stay with the house	Matches/lighter
7. Ladders	7. Plan where to meet in a bushfire emergency	First aid kit
8. Metal rakes/shovels	8. If you leave, decide what to take	Essential medication
9. Good access to water supplies	9. What should be done with pets?	Fire extinguisher
10. An alternative water source	10. How would a power failure affect the bushfire plan	Fire blankets
11. Fuel water pump	11. Have adequate insurance	Protective clothing
12. Keep grass mown short	12. Check your emergency kit	Bottled drinking water
13. Clear undergrowth close to house	13. Be aware of fire weather, and keep an eye on forecasts	Long-life energy food
14. Check roof coverings fit well, and maintain roofing	14. Be aware of fire danger ratings	Emergency contact details
15. Ensure no structures built of combustible material are attached to the house	15. Know what to do if fire is approaching	List and location of valuables
16. Screen off under-floor spaces		
17. Fix metal shutters to windows		

The preparation actions that householders are advised to undertake if living in bushfire risk areas are extensive, often time consuming, and sometimes expensive. However, these protective behaviours yield benefits for the householder, for the at-risk community, and for the

fire management agencies whose role is the protection of lives, property and infrastructure from bushfire damage.

For individual householders, the benefits of preparing are manifold, but chief among them is the ability of threatened householders to defend their own property (AFAC, 2005; Collins, 2008; Cottrell, 2005; Paton, 2006b; Paton*, et al.*, 2008a; Paton*, et al.*, 2006a; Tibbits & Whittaker, 2007). Additionally, bushfire preparation is the favoured policy in Australia (AFAC, 2005; COAG, 2004; McLeod, 2003) and many parts of the United States (Field & Jensen, 2005; Jakes, 2002; McCaffrey, 2004a, 2004b; Nelson, Monroe, & Fingerman Johnson, 2005; Steelman, Kunkel, & Bell, 2004). Effective bushfire preparation yields two valuable commodities in a bushfire context: the ability to increase the likelihood of defending the property (or reducing losses) reduces the householders' vulnerability to bushfire, and increases their resilience to bushfire hazard. The combination of lowered vulnerability and increased resilience means the well-prepared household and community will return to normal daily functioning more quickly following severe bushfire activity (Paton, 2006a; Paton*, et al.*, 2000b; Thomalla*, et al.*, 2006; Tobin, 1999; UN/ISDR, 2004; Whittaker, 2008). Preventing or reducing losses and being able to regain normal functioning following hazard activity are important factors influencing the disastrous nature of many natural hazards (CDRSS, 2006; Paton, 2006a; Paton*, et al.*, 2001b; Paton*, et al.*, 2000b; Thomalla*, et al.*, 2006).

Household bushfire preparedness also provides benefit at the community level. Within communities that exist in high bushfire risk areas, effective preparedness and action involves a mix of individual/household and neighbourhood/community preparedness. That is, decisions about mitigating bushfire risk must be made not just at the level of the individual or household, they must also be made in collaboration with others. Collective action is required to, for example, support burn-offs or controlled burns and to ensure that all households reduce the level of combustible materials in and around their properties. Collective action in bushfire preparedness is important because the safety of one household is dependent not only on their own preparations, but the preparations of the neighbours (AFAC, 2005). Paton and colleagues (2008a) showed that attachment to place and engaging with others from the community both increased the propensity of householders to consider community preparedness important. Communities who possess an awareness of bushfire, a collective

knowledge about how to address bushfire threat, and an interest in sharing the burden of preparing their communities to meet the possible threat of bushfire exhibit a higher level of community resilience. Their interactions concerning bushfire preparedness also increase their capacity to understand and address the uncertainty and challenging nature of events like bushfire activity (Eng & Parker, 1994; Hardin & Higgins, 1996; Lion, Meertens, & Bot, 2002).

Household and community bushfire preparedness eases the pressure on bushfire management agencies to protect property and lives. Current bushfire policy no longer expounds the "fire-fighter to the rescue" paradigm in bushfire management. While fire management agencies still retain many statutory responsibilities for managing bushfires, they also recognise the role householders and communities must play in their own protection, particularly when dealing with large fires whose intensity, size and duration present a hazard that exceeds the capacity of available resources. The Australian Fire Authorities Council (2005, p. 4) points out that "the steps that householders take to prepare for bushfires are crucial to the protection of their life and property". Bushfire management agencies clearly must still play a central role in controlling and combating bushfire, but this role is now focused more on providing support and assistance during bushfire activity, which can be hindered when householders have not adequately prepared their properties. This change in agency operations from "command and control" to co-operation has largely coincided with a realisation that individuals and communities can and should contribute to bushfire management and mitigation, and that in some cases no amount of fire-fighting resources can ensure the complete safety of the community. It has not, however, been matched at the level of risk communication. Thus, understanding the complex relationships between at-risk community members and civic agencies, through in-depth examination of preparation decision-making from a community psychology perspective, will be imperative when developing risk communication techniques that can manage and utilise these relationships (between people, communities and agencies) in a positive and productive manner.

The Australian Fire Authorities Council (2005, p. 4) points out that "managing [bushfire] risk and reducing loss is a shared responsibility between government, householders and land managers." Each level of society must play a role in mitigating threat from bushfire, and preparedness is the key action that enables each sector to effectively fulfill their duty.

However, although the benefits of preparing for bushfire are easily demonstrable here, and heavily communicated to at-risk community members through bushfire risk communication, householders continue to demonstrate poor knowledge of hazards and protective measures and a reluctance to adopt preparedness actions.

1.4 Why Don't People Prepare for Bushfire?

The movement toward the "shared responsibility" paradigm in Australian bushfire risk management has been supported by an increase in preparedness-focussed bushfire risk communication over the last decade. Risk communication is the key mechanism by which risk management agencies deliver information to the community about the community's role in mitigating bushfire risk. Yet despite the seasonal effort fire agencies and other risk managers (*e.g.* local government) invest in the formulation, production and dissemination of bushfire risk information, household and community bushfire preparedness levels remain low (Cottrell, 2005; McGee & Russell, 2003; Paton, 2006b; Paton*, et al.*, 2008a; Paton*, et al.*, 2006a; Paton & Wright, 2008; Prior & Paton, 2008).

Concomitant increases in population expansion that bring people closer to the bushfire-prone locations of Australia, and predictions of more intense bushfires in the future (Lucas, *et al.*, 2007), mean communicating the need for householders to prepare is becoming ever more important. There are many reasons why people do not prepare for bushfire (or indeed many other hazards), and these are chiefly connected to the techniques of risk communication used (Breakwell, 2000; Eiser, 1998; Graffy & Booth, 2008; Jardine & Hrudey, 1997), the social construction of risk (Bostrom, 2008; Bostrom*, et al.*, 1994a; Dake, 1992; Finucane, 2002; Kreuter, Clark, Oswald, & Bull, 1999; Lee*, et al.*, 2005; Lupton, 1999; McIvor & Paton, 2007; Olsen & Shindler, 2007), and the response of individuals to hazards as uncertain and unpredictable (Bennett, 1996; Keller*, et al.*, 2006; Kunruether & Pauly, 2004).

1.4.1 A universal message?

Traditional risk information has been delivered using mass communication techniques (such as brochures, videos or websites) that contain general information that does not often suit all recipients (*e.g.*, as a result of differences in demographics, knowledge, prior behaviour *etc*).

These processes focus more on the messages provided to the community rather than on producing information that is both understandable and meaningful, two characteristics that catalyse action by enabling people to connect with the information and realise its value within the context of their lives. Importantly, it is not information *per se* that determines action, but how people interpret it (*e.g.*, render it meaningful) in the context of their experiences, beliefs and expectations (Dake, 1992; Lion, *et al.*, 2002; Marris, *et al.*, 1998; Rippl, 2002). People apply these interpretive frameworks to information about hazards, the actions proposed to mitigate their adverse consequences, and the sources that provide the information (Paton, 2008b).

An example illustrates the complex nature of the link between risk communication and preparedness in a natural hazards context. Researchers have shown that individuals often transfer their own responsibility for preparedness onto emergency management agencies (Ballantyne*, et al.*, 2000; Johnston*, et al.*, 1999; Paton*, et al.*, 2000a). These authors suggest that the actions of emergency management agencies in constructing and disseminating preparedness and warning information may reduce perceptions of vulnerability, because risk communication is often suggestive of the emergency services' presence and capacity. This can transfer the community's responsibility for their own safety solely to emergency management agencies. This represents a form of cognitive bias known as risk compensation (Etkin, 1999; Fischhoff, 1995; Lupton, 1999), which reflects how people balance their perceptions of how safe the environment is with their need to act to enhance their safety – the presence of, or communication by fire management agencies causes people to believe they are at less risk, and consequently overlook the need to undertake protective behaviours.

Unrealistic optimism (Weinstein, 1980), where an individual is overly optimistic about the outcome of possible future events, poses a another cognitive bias that can affect the interpretation of a risk communication message – people who think they are already well-prepared or believe a risk will have little effect on them are unlikely to engage in risk-reducing behaviour (Burger & Palmer, 1992; Paton, 2006b; Russell, Goltz, & Bourque, 1995; Todesco & Hillman, 1999; Weinstein & Klein, 1996). Understanding the processes that lead individuals to develop these beliefs or biases is extremely important to ensure beneficial risk communication – especially in a bushfire context, where household preparedness can

significantly increase resilience and assist fire services to tackle situations given that resources for dealing with fires are finite. Consequently, community preparedness for natural hazards, perceptions of risk and the relationships that exist between different agents (person, community, institution) are inseparable and must be studied accordingly.

Irrespective of whether messages are understandable or meaningful, a failure to accommodate the relationship between the risk communicator and the information receiver can be a major limitation to the effectiveness of a risk message. Because risk messages are communicated to people who already have developed experiences, beliefs and expectations about bushfire and its management, they are often subject to circumstantial interpretation. For example, Prior and Paton (2008) observed that some older members of a community affected by a severe bushfire were unlikely to seek or respond to current risk communication information because they felt they had gained sufficient knowledge about bushfire through their previous experiences, even if that knowledge was outdated and contrary to current risk messages. Householders' previous experiences with the veracity of risk messages (Graffy & Booth, 2008; Olsen & Shindler, 2007; Paton, 2008b), or agency warnings (Emdad Haque, 2000), their experiences with the people who deliver these messages (Graffy & Booth, 2008), and their own perceptions about the likelihood of bushfire activity may all contribute to the extent individuals listen to or rely on the information contained in risk messages. Most importantly, individuals receiving risk information must have confidence that the actions detailed in that information are safe and, based on positive past experiences, demonstrate a "common sense" (where sensible is determined by the individual based on their experience, beliefs, attitudes *etc*) approach to mitigating risk: if not, the information is unlikely to be acted on.

The mass communicated nature of much risk information generally invites open and varied interpretation by the receiver. While some people are able to use this information because it suits their beliefs, knowledge or awareness about bushfire, others are unable to place it in the context of their lives or lifestyles. While the development and dissemination of these forms of risk information may save time and money for the risk communicator, for the most part they do not achieve their intended objectives and are, therefore, not cost-effective.

In general, many of the failings of passive, mass risk communication techniques lie partly with their inability to reach every individual all of the time, and partly because the message is not universally meaningful. People's emotions, beliefs, experiences and attitudes towards natural hazards, as well as their interaction with other people, all determine how people interpret, respond to and act on the information with which they are provided. As such, one risk message, structured in one way, and delivered using one or two inflexible media can never hope to inspire an effective and broad-scale response (*e.g.*, interviews conducted as part of this research suggested that while some people receiving the Tasmania Fire Service's *Prepare to Survive* information kit found it a useful information source, this positive response was by no means unanimous). In order to understand how people react to a risk or threatening situation, it is therefore necessary to delve into the individual characteristics that determine their perception of risk and the way in which they construct risk based on their own circumstances. Deeper examinations of the construction of risk in this way, that include examinations of the socio-cognitive processes involved in risk judgments and perception, can more fully inform the development of more effective risk communication development and identify why risk beliefs may be markedly different between agency and citizen.

1.4.2 The social construction of risk

The concept of risk from natural hazards describes the assessment of the frequency of occurrence and consequences (*e.g.*, nature, magnitude, duration *etc*) associated with hazard activity (Paton*, et al.*, 2000b). This definition implies a purely technical concept, which is suited to institutional use (because it informs the development of risk messages), but does not inform the meaning of risk from the perspective of the layperson. The focus on risk in a purely probabilistic context, as has been the practice of many hazard management agencies when communicating about risk, has overlooked the fact that individuals who receive risk information construct their idea of risk in a very different way, yielding different conceptions. The social construction of risk ensures many community members view well-known risks in ways that often oppose those concepts held by risk management agencies (Hannigan, 2006; Lupton & Tulloch, 2002). People interpret risk information in the context of their past experiences, their beliefs and their relationships with others (*e.g.* other community members).

As such, the channels through which this information is distributed may have a considerable impact on its use and usability.

Communities of place (locational), or interest (relational) are inherently different (Bell & Newby, 1974). Communities of place are groups that form because of geographic closeness, while communities of interest establish around shared beliefs, attitudes, cultures or interests. Research suggests that where once communities were predominantly locational, they are increasingly becoming relational (Forrest & Kearns, 2001; Trewin, 2006). Most suggest this change is a result of the current "communication age", which allows individuals to more easily maintain social networks that are not geographically based (Forrest & Kearns, 2001; Morrison, 2003; Putnam, 2000; Trewin, 2006). This has significant implications relating to the availability of place-based information from other members of the locational community that could be used to interpret and understand risk information. Particularly in the case of bushfire, which directly affect locations, if the residents are not well connected to their neighbours, the community may have less collective capacity to meet the threat of bushfire (Indian, 2008; Paton*, et al.*, 2008a).

Many individuals rely on other people to help them interpret risk information (Bishop, Paton, Syme, & Nancarrow, 2000; Carroll, Cohn, Seesholtz, & Higgins, 2005; McIvor & Paton, 2007; Paton*, et al.*, 2008a; Paton*, et al.*, 2006a; Prewitt Diaz & Dayal, 2008; Prior & Paton, 2008; Vieno, Santinello, Pastore, & Perkins, 2007). People's involvement in locational (place-based) or relational (interest-based) communities (or both) may have positive or negative influences on how those people receive and act on risk messages (Paton*, et al.*, 2008a).

Where sense of community does not exist at the level of the street or neighbourhood, it is possible that the members of these communities may have formed stronger connections within "communities of interest", which have formed around other aspects of their lives (Graffy & Booth, 2008). For example, these groups might form around their children's soccer teams, work or the local café. Issues within these relational communities are considered more important, and attributed greater attention than issues within their neighbourhood. However, communities of interest in bushfire management, forming around local volunteer fire brigades, certainly increase bushfire awareness and preparedness in those members (Prior & Paton, 2008). Knowledge of the way householders interact with their friends, family or work

colleagues (from outside their neighbourhood) is therefore an important consideration in the development and distribution of risk messages.

Members of society or societal institutions each bring their own interpretative processes to bear on the task of understanding and reacting to risk. Hazards are dealt with in a socially constructed fashion (Cottrell, *et al.*, 2008), where hazard risk is considered in light of culture, knowledge, beliefs and experiences. Although there is always an objective level of risk associated with a hazard, public perception of that risk may be clouded by social and cultural processes. Risk management agencies often find it difficult to reconcile their objective assessments of risk with the socially constructed understandings of the community members for whom they target risk information. Unsurprisingly, many risk communication efforts fail to engender their intended result (Emdad Haque, 2000; Grothmann & Reusswig, 2006; Löfstedt & Renn, 1997; Prior & Paton, 2008) - like ships in the night, the objective risk communicated by agencies sails directly past the subjective nature of the community member's risk-related beliefs.

The social construction of risk may also prevent community members from recognising the risky characteristics in the environment where they live, precluding an effective response to those characteristics (Brenkert-Smith*, et al.*, 2006; Burger & Gochfeld, 2006; Graffy & Booth, 2008; Grothmann & Reusswig, 2006; Kohler*, et al.*, 2007; Lee*, et al.*, 2005). The nature of the social networks within which people associate can have dramatic influences on the perceptions of their environment (Alesina & La Ferrara, 2000; Berkman, 1995; Forrest & Kearns, 2001; Kohler, *et al.*, 2007; Morrison, 2003). Social networks, which develop in response to bushfire threat and the collective recognition of danger that inclusion in such a network can bring, promote preparation and mitigation of bushfire risk, and help householders to distinguish and address bushfire risk. In these networks or community groups bushfire risk becomes a culturally relevant and important part of the members' lives – they are established around knowledge sharing and awareness about bushfire because the members value these information assets very highly, and will use these assets to help translate their new-found knowledge into mitigation action. By contrast, people whose social networks or social influences are not bushfire orientated are unlikely to seek to develop ideas of bushfire

awareness, and this is true in many risk-related phenomena (Berkman, 1995; Clarke & Short, 1993; Cottrell, *et al.*, 2008; Kohler, *et al.*, 2007).

Importantly, just living in an area known to be a high bushfire risk location is not enough to engender a risk averse attitude to that environment, risk acceptance, or the adoption of behaviours designed to mitigate that risk. Decisions about interpreting risk and how to address it, are not made in isolation, but with respected or significant others (particularly when the issues are complex, uncertain or rare) (Bishop*, et al.*, 2000; Flora, 1998; Kohler*, et al.*, 2007; McIvor & Paton, 2007; Morrison, 2003; Obst, Smith, & Zinkiewicz, 2002; Paton*, et al.*, 2008a; Paton*, et al.*, 2006a; Prewitt Diaz & Dayal, 2008; Vieno*, et al.*, 2007). Individuals with less knowledge or experience of risk rely on family, friends or neighbours to interpret the risk presented by the environment where they live. Consequently, the social construction of risk becomes an extremely important consideration for risk management agencies. Without specifically contemplating the social construction of risk, the objective of increasing community preparedness may be consistently frustrated. Community engagement in the development and delivery of risk education programs will be a key mechanism for engendering better interpretation and understanding of risk messages among the wider community (Prior & Paton, 2008). Identifying and instituting such a process requires the development of an appropriate theoretical framework from which to research this aspect of risk communication, and will be a key concern in this thesis.

1.4.3 The inherent uncertainty of natural hazards

The consequences of many of life's decisions are plagued by uncertainty, so each decision must incorporate an assessment of the "desirability of possible outcomes and their likelihood of occurrence" (Tversky & Fox, 1995, p. 269). The more we assess these two attributes (possible outcome and probability of occurrence) when we make the same uncertain choices, the better we *may* become at judging the consequences and we *should* therefore make better decisions. However, where uncertainty is present rational decision-making is not always a given (Basili, 2006; Donovan & Blake, 1992; Jones, 1999; Slovic, Finucane, Peters, & MacGregor, 2004).

People often do not reach rational decisions as a result of their cognitive reasoning – partly because of the social construction of risk, and partly because active cognition is undertaken with the information at hand, and often with deduction aimed not at reaching a rational outcome, but to reach the most agreeable outcome (Finucane, Alhakami, Slovic, & Johnson, 2000; Loewenstein, Hsee, Weber, & Welch, 2001; Tversky & Kahneman, 1974, 1981). It is quite clear that an individual's judgement can be biased by their beliefs, attitudes, feelings and emotions at the time the decision is made (I liked the car's colour and forgot to look under the bonnet), leading to illogical choice (Bechara, Damasio, Tranel, & Damasio, 1997; Donovan & Blake, 1992; Jones, 1999; Kahneman, 2003; Simon, 1955). Tversky and Kahneman (1974) showed that individuals rely heavily on affect heuristics to guide their judgement, enabling them to simplify otherwise difficult choices. But once the choice is simplified in this way, judgemental errors are likely to become more common (Finucane, *et al.*, 2000; Jones, 1999; Kahneman, 2003; Sjöberg, 1982; Slovic, *et al.*, 2004; Tversky & Kahneman, 1974). This plays a role even in choices familiar to the decision maker (Tversky & Kahneman, 1974), but in familiar circumstances individuals are likely to be able to better judge the possible outcomes and estimate how likely these are to occur, giving them some ability to choose advantageously to avert risk (Bechara, *et al.*, 1997; Finucane, *et al.*, 2000; Fox & Levav, 2000; Kahneman, 2003; Keller, *et al.*, 2006; Sjöberg, 1982).

On the other hand, natural hazards are rare, unpredictable, and pose unfamiliar risks (Emdad Haque, 2000; McCaffrey, 2004b; Mileti & Fitzpatrick, 1992; Ripley, 2006; Slovic, 1987). Under such ambiguity our choices can't be informed by familiarity because we have no experience, we often can't conceive of the effects of such threats, and it's difficult to respond to them given we have little knowledge about how or when to do so (Basili, 2006; Basili, Chateauneuf, & Fontini, 2005). In these circumstances uncertainty and unfamiliarity contribute to the hazardous nature of the circumstances in which people find themselves. What confounds our decision-making further is the fact that the consequences we face, if we have made poor judgements or have not processed the available information adequately when a natural hazard actually occurs, can be life threatening.

Tversky and Kahneman (1974) showed that people assess the probability of uncertain events using several judgemental heuristics. Although the heuristics of representativeness

(judgements are based on similarities with known elements), availability (frequency by which events can be recalled) and anchoring (judgements about an event are determined based on perceived starting points) provide workable mechanisms by which individuals formulate ideas about uncertain events, they mostly result in judgemental errors. Whether people employ such heuristic principles to educate their conceptualisations of risk and probability is not a function of their desire to understand uncertain events, but simply to compensate for the little knowledge they possess about these events, whose effects might be clarified if they can develop some idea as to why or how they might operate.

Therefore, uncertainty is essentially a state of "not knowing" (Kahneman & Tversky, 1982; Powell, *et al.*, 2007; Tversky & Kahneman, 1974). Members of the public are generally limited by their own knowledge, the knowledge of others, the knowledge that exists around them, an inability to find out (and having to rely on second-hand information) or a combination of these. Under these circumstances we attribute probabilistic judgements (Fischhoff, *et al.*, 1982; Siegrist, 1997; Tversky & Kahneman, 1973) to risks in order to legitimise our "not knowing" by asserting that although unpredictable, a risk is nevertheless possible within some future time frame. Risk communicators have often resorted to communicating probabilities in order to engender responses to environmental risk, yet these techniques are now shown to be next to useless (Siegrist, 1997) partly because they perpetuate these states of "not knowing".

Distressingly, even when we don't know, we must still make decisions about natural hazards. The fundamental uncertainty of natural hazards has dramatic influences on whether we actually choose to undertake those protective behaviours communicated to us by risk management agencies (Nisbett & Ross, 1980; Powell, *et al.*, 2007; Tversky & Fox, 1995; Tversky & Kahneman, 1992). If we believe that the chance of a hazard occurring is minimal, then we are unlikely to consider mitigating the risk from that hazard as important – particularly when there are many other pressures in our lives that require more immediate attention (Fox & Irwin, 1998; Hill & Thompson, 2006; Weinstein, 1989). Laypeople use information acquired from multiple sources (first-hand experience, media, interpersonal relationships) to construct their ideas of risk and hazard likelihood (Powell, *et al.*, 2007). What they know, but also what they don't know can affect the way they interpret environmental risk information, their perceptions of that risk, whether they feel they require more information about the risk, and

whether they should act to mitigate the effects of that risk. So the uncertainty of natural hazards plays a key role in determining how we respond to the threat such risks pose.

1.4.4 How do we make decisions?

In order to make a decision an individual must be presented with at least two alternative choices. Each alternative poses the individual with a different set of consequences and it could be assumed that the individual applies their knowledge and reasoning ability to decide on the most rational course of action to reach the most satisfactory outcome based on their preferences (Simon, 1955; Ward, 1954). However, this is not strictly the case (Finucane, *et al.*, 2000; Jones, 1999; Kahneman & Tversky, 1979, 1982; Machina, 1987; Simon, 1955; Sjöberg, 1982; Tversky & Fox, 1995; Tversky & Kahneman, 1974, 1981). Individuals are active information gatherers (Nisbett & Ross, 1980), and as such we make decisions that reflect the environment in which we live – our decision-making does not always result in the same decisions because we interpret the information we have using a mental model and in the context of the situation we find ourselves.

Classical theory examining decision-making under risk is based on expected utility (Bernoulli, 1954; Ward, 1954), and posits that an individual makes a choice after weighing the utility (cost or benefit) of each outcome against its probability of occurrence (Tversky & Fox, 1995). The expected utility theory has been accepted as a model of rational choice and applied widely to economic behaviour because of its ability to describe risk-averse and risk-seeking behaviours. However, a considerable body of more recent work suggests rationality is a construct of the individual (Basili, 2006; Donovan & Blake, 1992; Jones, 1999; Kahneman, 2003; Kahneman & Tversky, 1979; Slovic, *et al.*, 2004; Tversky & Kahneman, 1992). Decision-making is far more complicated than can be represented by this classical theory – primarily by the fact that choice is a process of individual operational reasoning (Jones, 1999; Kahneman, 2003). The ultimate choice made by the decision-maker is dynamic and rational for the individual at the point in time when it is made. Every person holds different beliefs, emotions, attitudes and experiences, and these make conscious or unconscious contributions to a final decision. The individual may intend to make rational choices, but they may not necessarily succeed because their rationality is “bounded” by their “internal make-up” (Jones,

1999, p. 298). “Rational” choice is confounded by the “overt or covert” cognitive processing that individuals engage in when making risk-related decisions (Loewenstein, *et al.*, 2001, p. 267).

That individuals make decisions bounded by their own rationality, situational influences and the social construction of risk poses difficulties for those agencies producing standardised outreach material designed to encourage householders to mitigate the impacts of bushfire. Risk communicators and householders exist together on a rationality continuum that is perceived differently by each player. What is considered a rational choice by one, may not be viewed in the same way by the other. The result is likely to be miscommunication, misunderstanding or misinterpretation of risk communication information (Grothmann & Reusswig, 2006; Mulilis, 1998; Paton, 2003, 2006b; Recchia, 1999; Slovic, 1986). Kahneman and Tversky (1979) supported the contention that individuals are not entirely rational, showing that decisions made under uncertainty in particular often violate the principles of risk aversion, and that individuals “identify consequences as gains or losses relative to a neutral point” (Kahneman & Tversky, 1982, p. 137), rather than as static outcomes with specific costs or benefits. They describe the ability of the individual to learn and form knowledge structures, or heuristics, that enable them to process complex information quickly, with minimal effort, but sometimes mistakenly.

This is a view direct from the expert’s objectively rational mind. Because people process information quickly, based on their own situational reality (and mental model), they come to decisions that are not necessarily “mistaken”, but which simply reflect fundamentally different reasoning processes from experts (Bostrom*, et al.*, 1994a; Bostrom*, et al.*, 1992; Cox*, et al.*, 2003; Fischhoff*, et al.*, 1982; Zaksek & Arvai, 2004). The concept of the “mental model” (Bostrom*, et al.*, 1994a; Zaksek & Arvai, 2004), or the notion that people tend to assemble their knowledge of risks into a conceptual map of ideas provides a basis from which to begin to understand how laypeople’s perceptions and actions concerning a risk may differ so dramatically from experts that they are then deemed to be mistakes.

Risk communicators perceive the information and advice they provide to the public to be objective, rational and warrant rational action. Their outreach materials are derived from the substantial knowledge gained through the experience of their organisations and the

information they provide is based primarily on that experience. The material risk communicators produce and distribute is therefore elucidated by the communicator's mental model of risk, and considered to be objectively rational. Risk communicators expect those people who receive their information to follow the advice logically and rationally. In the eyes of the fire-fighter, leaving a defendable house when flames are within view would be considered an irrational choice.

The householder's bushfire mental model may either reflect or contradict the risk communicator. Many people who receive risk information perceive they live at risk, recognise the logic on which the risk communication information is based and act "rationally". However, a large proportion of the people receiving risk information act in a manner that can differ radically from how risk communicators would expect them to act. As discussed previously, the way these people interpret their situation is directed by their own reasoning about bushfire, which is strongly influenced by their intrinsic state of mind concerning bushfire: Is bushfire good or bad? Can bushfire be controlled or managed? What impact will it have? Is it a threat to my life or lifestyle? It is also a product of their social interactions and their social construction of risk. In a hypothetical situation, a householder living in a peri-urban fringe area prepares their house as they see fit; the bushfire arrives but it is far bigger than they expected; they question their preparations and the rationality of waiting for a bushfire to "burn over them" and quickly get in their car with the intention to outrun the fire. Sadly, this is not a hypothetical example, but occurs repeatedly with every major bushfire event in Australia (Handmer & Haynes, 2008).

The importance of an individual's mental model in their decision-making about hazard risk communication points to a need to understand how that model is formed. The way a person cognitively processes the information they consider to be relevant in a decision determines how this model is formed. Not only does this occur as a process of individual reasoning, it is also influenced by the individual's social interactions and the diversity of motivational and interpretive processes an individual relies on when decision-making (Paton, 2003). Together, these processes highlight the need for a thorough understanding of the reasoning and judgement that underpins the adoption of protective behaviour generally, and hazard preparedness in particular, and how these relate to the interpretation of risk communication

information. In order to understand the development of the individual's mental model regarding bushfire preparedness, and develop risk communication messages that target the deficiencies in these models, it is necessary to consider the socio-cognitive processes that underpin bushfire preparedness decision-making (Paton, 2003).

1.5 Examining Preparedness Decision-making from a Socio-Cognitive Perspective

Social cognitive theory (Bandura, 1986) suggests that the acquisition of knowledge and the way people learn is strongly influenced by their observation of the people around them. It posits that learning or development is influenced strongly by the environment, behaviour and cognition, and that these factors operate in a bi-directional fashion (Bandura, 1988) in determining how people behave. Because it does not focus on the individual's cognition as the sole determinant of behaviour, social cognitive theory has become an important mechanism that can be used to understand how individuals make sense of social situations.

Social cognitive theories have spurred the development of social cognitive models (SCMs), which have been used to describe how different aspects of cognition (thinking), and the inter-relationships between these cognitions, can ultimately determine behaviour (Hardeman, *et al.*, 2002). The Theory of Planned Behaviour (TPB) (Ajzen, 1985), the Health Belief Model (HBM) (Rosenstock, 1974), the Protection Motivation Theory (PMT) (Rogers, 1975; Rogers, 1983; Rogers & Prentice-Dunn, 1997), and the Person-Relative-to-Event Model (PrE) (Duval & Mulilis, 1999; Mulilis & Duval, 1995) are four particularly important SCMs that have been applied in the psychological literature to firstly understand people's behaviour in relation to risk, and secondly to provide mechanisms that help influence behaviour change through interventions like the dissemination of risk communication information (Armitage & Christian, 2003; Kraft, Rise, Sutton, & Røysamb, 2005; Sheeran, Trafimow, Finlay, & Norman, 2002).

The TPB is a theory describing the link between attitudes and behaviour, and extended the Theory of Reasoned Action (Fishbein & Ajzen, 1975) through the inclusion of the perceived behavioural control construct derived from Bandura's (1977) Self Efficacy Theory. The HBM was developed to predict behavioural responses to the treatments received by chronically ill patients, and has since been more broadly applied in relation to health behaviour, in

examinations of other risk-related behaviours, and in risk communication (Eiser, 1998). Protection motivation theory provides an elaborate mechanism to understand human behaviour in the context of risk (particularly health risks). The PMT relies on the assumption that fear-arousing communication convinces the receiver of a threat, and that this perception instigates “coping appraisal” (adaptive behaviour) and “threat appraisal” (maladaptive behaviour). The PrE model builds on PMT, aiming to elucidate the conditions that promote problem-focused coping in the context of negative threat appeals (*i.e.* fear-arousing persuasive communication). The PrE model is important because it integrates both personal and environmental aspects of threat in order to understand the individual’s willingness to engage in behaviour that ameliorates that threat.

These four key SCMs have been used variously in the environmental hazards preparedness literature, and provide generic mechanisms to understand and predict behaviour from individual and social points of view. They have also been used to develop techniques by which “undesirable” behaviour may be changed. While any one of these models could be used to understand some of the cognitions important in bushfire preparedness decision-making, they are limited in their scope and specificity, and consequently the predictors of behaviour they rely on. In order to most fully understand preparedness behaviour in the context of bushfire threat, it is necessary to draw on these models for examples of predictor variables (*i.e.* the cognitions), but not be constrained by the generic limitations they pose.

Social cognitive models describing human cognition help researchers to understand how people think about issues, but more importantly, how the interacting cognitions concerning those issues determine the way people behave. SCMs are consequently very useful tools for understanding why people don’t behave in the ways we think they might or should. What has become clear over the past few decades is that while people may form accurate perceptions of their risk from natural hazards, there is no direct link between this and the adoption of actions that can ameliorate this risk (Anderson-Berry, 2003; Davis, Ricci, & Mitchell, 2005; Greene, Perry, & Lindell, 1981; McCaffrey, 2004b; Paton*, et al.*, 2001a; Paton*, et al.*, 2000a; Paton*, et al.*, 2004). A crucial issue here is how people (individually and collectively) reason about their relationship with their environment. This includes, for example, their choosing to live in an area for lifestyle or economic reasons and their need to take steps to co-exist with

the particular characteristics of that area that contribute to their wellbeing, but that can also become hazards. These factors, and the associated community context that sustains beliefs, must be taken into account if an understanding of the personal and community predictors of bushfire preparedness are to be developed, because the individual's interpretation of risk and their interaction with others are important factors in their preparation. For example, what is the relative contribution of cognitive, social-cognitive and social factors to protective actions? How does this influence the choice to prepare or not prepare and what influences the adoption of household versus community preparedness?

The realisation that behaviour change is not necessarily driven by the antecedents of behaviour, like risk perception, but more by processes of individual reasoning, has been led by research in the field of health protective behaviour (see for example Abraham, Sheeran, & Johnston, 1998; Bennett & Murphy, 1997). Examinations of the socio-cognitive determinants in decision-making concerning the adoption of protective behaviour have provided insights not only into behaviour change, but how these changes may be maintained over time (Paton, 2003). By identifying the processes within individual reasoning, risk communication can be more efficaciously targeted to increase and sustain protective behaviour.

The factors that influence how people reason about the hazardous aspects of their environment are diverse. Previous experience with a natural hazard or understanding of the hazard; interaction with hazard management agencies; interaction with the environment in which they live; relationships within the community; and media, can all contribute to decision-making by building cognitive, affective and behavioural attitudes towards risk at a personal level (Anderson-Berry, 2003; Dake, 1991; Davis*, et al.*, 2005; Gardner*, et al.*, 1987; Greene*, et al.*, 1981; Jakes, 2002; McCaffrey, 2004b; Recchia, 1999; Short, 1984; Sjöberg, 1998, 2000; Slovic, 1987; Smith, Michie, Stephenson, & Quarrell, 2002; Toman, Shindler, & Reed, 2004; Wåhlberg & Sjöberg, 2000; Wildavsky & Dake, 1990; Wohl, 1998). But, while individuals' attitudes to risky situations may be attributed to a wide range of causes (*e.g.* risk compensation), research suggests that a person's beliefs about the object that causes risk (*e.g.* "bushfire") are most important in determining their response. Paton (2003, p. 210) identifies that these "cognitive processes… underpin behaviour change" and may be more

informative when examining community preparedness for natural hazards, than simply examining risk (Paton, *et al.*, 2005).

As such, more emphasis has recently been placed on the need to elucidate the social-cognitive processes leading to the adoption of protective behaviours, or more precisely, preparation (Paton, 2003; Paton, *et al.*, 2005). Research examining the socio-cognitive determinants of hazard preparedness have both reiterated the importance of various factors contributing to preparedness reasoning identified by examinations of health protective behaviour, and identified additional factors that play a role in influencing natural hazard preparedness decision-making (Bishop*, et al.*, 2000; Duval & Mulilis, 1999; Lindell & Whitney, 2000; Mulilis & Duval, 1995; Paton*, et al.*, 2001a; Paton*, et al.*, 2000a). However, to date the collective influence of those factors identified as predictors of hazard preparedness have not been examined and modelled in ways that contribute to more comprehensive bushfire theory development. Without longitudinal or geographical comparisons, previous work has not facilitated the development of more comprehensive hazard awareness programs by identifying key community-specific differences that influence the perception of risk and interpretation of risk communication information, and which reflect the multi-level nature of the influences on protective behaviour.

1.6 Why is this Research Necessary?

The exploration of natural hazard preparedness, risk communication and associated issues in the previous sections provides a summary of the core problems and possibilities associated with engendering behaviour change toward the adoption of protective behaviours. It has also identified several key areas where this research thesis can contribute both to the theoretical aspects of preparedness in general, and to the practical aspects of bushfire preparedness and risk communication specifically. The research will address the following issues:

i. In light of the demonstrated link between individual and community in many forms of decision-making and behaviour, this thesis will specifically identify the relationships between individual and community processes. While effort has previously been directed at elucidating the individual characteristics relevant to bushfire preparedness decision-making, examinations from a community psychology perspective have not been carried

out. Given the nature of bushfire as a community threat, rather than strictly an individual/household threat, the need for a simultaneous assessment of both individual and community level factors that play a role in the decision to prepare for bushfire is extremely important.

ii. Developing a bushfire specific model of preparedness decision-making is a key requirement for the practical application of this research in a risk communication sense. The primary objective of this thesis is the development of a model that describes the way people think about bushfire preparation that can be used by Australasian bushfire risk managers to increase the level of community preparedness for bushfires throughout the region. While the research should also contribute to theory development and progression in a preparedness sense, this is secondary. Existing models describing human behaviour in relation to the adoption of protective behaviours would probably be sufficient to provide generic explanations of why or why not people prepared. However, to be of practical use to risk managers, this research must make a deep and systematic examination of bushfire preparedness decision-making, using a qualitative approach to build up a specific picture of the key factors in the decision-making process. Conducting this work in a longitudinal rather than cross-sectional manner will add deeper meaning to the data resulting from this inquiry.

iii. Examining bushfire preparedness in geographically distinct areas. Including a geographic component in this research will provide not only the ability to examine differences in the ways different communities think and act in response to bushfire threat, it can also provide a basis from which to evaluate the utility of passive risk communication techniques – if the members of geographically distinct or non-distinct communities think about bushfire and act in diverse ways, then this will give added weight to the idea of socially constructed risk and the need to look beyond passive, mass-communicated risk information.

iv. A dedicated examination of the factors identified by Paton *et al.* (2006a) in the bushfire preparedness context will clarify the roles of some of these variables. In particular they identify that the variable “critical awareness” can play roles in predicting both “preparing” and “not-preparing” outcomes. This finding is counter-productive in a

practical risk communication sense because targeting the development of “critical awareness” could not be used by bushfire risk management agencies to increase community bushfire preparedness.

v. What is “rational” and what is “irrational” behaviour in relation to bushfire preparedness? What does the mental model relating to bushfire preparedness look like, and how can we use this knowledge to increase preparedness? Examining the socio-cognitive factors involved in the decision to prepare for bushfire will enable an understanding of why some individuals act in seemingly irrational ways, even when provided with rational choice alternatives. Conversely, knowledge about why at-risk individuals make the decisions they do can help risk managers to appreciate the “irrational” behaviour of some people, and develop more appropriate mechanisms to encourage the behaviours they want and discourage those they wish homeowners to avoid.

vi. A methodologically robust approach is needed to address these questions. Combining qualitative and quantitative data collection and analysis ensures both a deep exploration of factors involved the bushfire preparedness decision process, and a means to statistically assess the relationships between these factors. Qualitative data and analyses must form the backbone of this work because it is this technique that can elucidate which factors are important, how important they are, in what circumstances they play a role, and how each factor relates to the next – this information will provide the basis on which to make further assessment, conclusions and provide the foundation for the development of a testable bushfire preparedness theory. Quantitative data must play a secondary role, and can be used to support observations made from the qualitative data.

1.7 Thesis Aim

In this thesis, the aim is to identify, describe and model socio-cognitive decision cues at individual, community and institutional levels that determine the way at-risk householders decide to prepare for bushfire. This knowledge is intended to contribute to improved bushfire

risk communication by providing bushfire risk managers with information that helps them to more effectively target their education material at the at-risk public.

To achieve this aim, I have concentrated on meeting the following specific objectives:

1. Using a qualitative methodology to identify the socio-cognitive predictors of individual and community preparation for bushfires, including:
    a. Examining the attitudes, processes, influences, experiences, behaviours, intentions and beliefs that householders consider in the decision to prepare.
    b. Describing the social, institutional and environmental factors that influence the individual choice to prepare.
2. Using this qualitative information to develop a substantive multi-level model of bushfire preparedness, which demonstrates the relationships between these socio-cognitive factors and places them in the context of the risk communication and preparedness process, particularly within the scope of community preparedness.
3. Validating and testing this substantive model using data collected from householders living in temporally and geographically distinct high bushfire risk areas of Australia.
4. Exploring the societal-institutional interplay in relation to bushfire preparedness. In particular, examining how the actions of fire agencies promote or dissuade preparation.
5. Discussing how decision-making cues to preparedness can be used by bushfire risk communicators to increase community preparedness levels.

1.8 Thesis Structure

The thesis is structured in a procedural fashion, where each new chapter reflects the next step in the research process. A description of basic demographics in the sample locations is followed by a detailed qualitative examination of preparedness decision-making, and the proposal of a structural model representing a hypothesised bushfire preparedness decision-making process. This structural model is confirmed and validated against quantitative survey data, and the findings from this examination are discussed in a community bushfire

preparedness context. In light of these examinations a less parsimonious theory is presented as a future direction in examining bushfire preparedness decision-making. The following provides a detailed outline of the contents of each chapter.

Chapter 2 provides a general methodological background to the research project. It describes the mixed methodology techniques used to collect and analyse qualitative and quantitative data about householder preparation, and in particular the measures used to obtain the quantitative data and how those measures are tested psychometrically. Each subsequent chapter has a separate methodology section providing specific information relevant to the analyses conducted therein.

Chapter 3 describes bushfire preparedness in the Hobart and Sydney locations surveyed. It provides a contextual background for the remainder of the thesis, showing that although many people have undertaken some form of preparation around their homes, most people are not well-prepared. It demonstrates that bushfire preparation can be correlated to a number of demographic features of the community and shows that some preparations are more likely to be undertaken than others, but that these are not necessarily the most effective in a threat situation. By cross-referencing reported preparations with interviewees' discussions about their preparedness it also shows that householders over-report their preparedness level. I conclude this chapter by pointing out the need for risk communicators to move beyond attributing preparedness to the socio-economic or demographic features of the community, to considering an understanding of the social-psychological cues to preparing.

Chapter 4 takes the step toward identifying the socio-cognitive cues to bushfire preparedness. Qualitative data are used initially to gain a deep understanding of the most important factors that householders consider when deciding whether they will prepare or not. These factors are triangulated against key factors identified from the quantitative data to build a suite of the preparedness decision cues. Each cue is described in the context of the data type from which it was identified, and the causal relationships between all decision cues are elucidated. Using this information I construct a substantive model of the bushfire preparedness decision-making process.

The objective of **chapter 5** is to examine bushfire preparedness decision-making specifically. In it I validate and test the substantive model developed and described in chapter 4. Quantitative data collected from Hobart peri-urban suburbs in 2006 are shown to fit the model exceptionally well, and successfully validate the model. The model is then tested using data from Hobart and Sydney collected during the following bushfire season (2007), ensuring a temporal and spatial test of the model. In discussing these results I identify some of the key processes in decision-making, particularly the roles played by positive and negative outcome expectancy, sense of community and intention. I also demonstrate the importance of community variability and the social construction of risk, both from a modelling point of view, and from the point of view of the bushfire risk communicator.

In **chapter 6** the scope of the modelling process is broadened to address this community variability and social construction of risk. In order to successfully address some of the shortcomings of the initial model, additional decision cues are incorporated. I include several socio-environmental and institutional cues that were identified in chapter 4, but whose importance was then considered secondary to the decision cues actually examined. While this theory incorporates components of the original theory tested in this thesis, it also assimilates the results of the research to propose a more generally descriptive model of bushfire preparedness decision-making. I describe each of the relationships between decision cues, beginning from the bottom up, and include a discussion of the cue's importance in a risk communication context. I conclude by pointing out the necessity of combining a knowledge of preparedness decision-making with a concerted effort to identify and understand characteristics of the community that may help or hinder their acceptance and use of risk communication information.

Chapter 7 returns to the aims of the thesis and integrates the various chapters by describing and discussing the most important findings from each. I focus these discussions in the context of their importance for future risk communication and bushfire awareness programs, and suggest the necessity to move beyond risk communication to "risk engagement" as a key mechanism to increase bushfire preparedness, and address many of the issues resulting from traditional risk communication practices. I conclude by identifying implications for bushfire risk management that have been derived from this thesis.

2. General Methodology

2.1 Introduction

This thesis is designed with two distinct, but complementary steps. The first step aims to develop a theory that describes the way individuals living at risk from bushfire choose a course of action to mitigate their risk. The second step aims to test the validity of this theory. In order to accomplish the objectives associated with these steps a mixed methodology of qualitative and quantitative data collection and analysis has been used to explore bushfire preparedness decision-making in this thesis. Qualitative data is of primary importance in the thesis and has been used to guide the formation of a testable theory of bushfire preparedness (the grounded theory approach of Strauss and Corbin, 1990). Quantitative data is used secondarily in order to confirm the validity of this theory with survey data and to quantify the relative importance of the primary factors influencing bushfire preparedness decision-making.

The following is an outline of the general qualitative and quantitative methodologies that form the basis of data collection for the thesis. Where necessary, specific methodologies or variations on the general methodology are provided in the relevant chapter.

2.1.1 Why use a mixed methodology?

Using a mixed methodology of both qualitative and quantitative assessment provides a pragmatic approach to answering complex social science questions (Flick, 2006; Tashakkori & Teddlie, 2003). Tashakkori and Teddlie (2003, p. ix) suggest the mixed methodology approach presents a “third methodological movement”, one that overcomes the difficulty of choosing between qualitative and quantitative paradigms by presenting a complementary alternative. The mixed methodology satisfies both the need for deep understanding of social issues, interaction and processes, as well as the often strong requirement that these explorations should be backed by testable and replicable data and findings.

Presently two general models exist to undertake mixed methodological research (Kelle & Erzberger, 2004), which are by no means mutually exclusive: the *phase model* and *triangulation*. The phase model (Barton & Lazarsfeld, 1956) employs qualitative methods in

the development of theory that can then be tested using quantitative methodologies and lends itself well to the application of Grounded Theory analysis. While this model was developed (by quantitative researchers) to strengthen qualitative research that was seen as unsystematic and based on too few samples (Kelle & Erzberger, 2004), the technique need not be used in this way, but applied with both methodological paradigms being mutually beneficial.

Utilising a mixed methodology also allowed the research findings to be triangulated (Kelle & Erzberger, 2004) from multiple data sets and use the complementariness of each methodology to compensate for the weaknesses of the other (Flick, 2006). The benefit here lies in the ability to use autonomous data sets to hone the issue of study and reach findings that are strengthened by the fact that they are corroborated by both data sets. Triangulation enables the researcher to broaden the scope of their findings (Flick, 2002) by an "enlargement of perspectives that permit fuller treatment, description and explanation of the subject area" (Kelle & Erzberger, 2004, p. 174).

By combining the paradigms of qualitative and quantitative research methodologies more robust conclusions can be drawn about social issues. This is a particularly helpful characteristic considering the complexity observed in the systems and processes that regulate these social issues. Utilising the mixed methodology approach in this thesis has ensured the best possible means of combining qualitative grounded theory analysis with the quantitative modelling of individual decision-making.

2.1.2 How is the mixed methodology applied in this research?

The qualitative component of this thesis is viewed as the most important because it enables the development of theory grounded on the basis of the views of the people who are making decisions about bushfire preparation. It has been said that the strength of qualitative data is derived from the possibility that researchers can explore, understand and describe the social world "from the inside out" (Flick, von Kardoff, & Steinke, 2004, p. 3), utilising the participant as a trusted *source* of information rather than simply a *piece* of information. Even so, using quantitative techniques to model and test the resulting theory is also an extremely important step in the research design of this thesis.

Both mixed methodology models described in section 2.2.1 are employed in this thesis. The general methodology of the thesis itself is based on a variation of the phase model and used to combine grounded theory qualitative techniques with quantitative modelling of the resulting theory. In-depth interviews conducted with homeowners living in peri-urban, high bushfire risk areas of Hobart are used to develop a generalised and substantive theory reflecting the way these people make decisions about preparing their homes for bushfire. Quantitative data were then collected from these same homeowners (and many others in Hobart and Sydney) using a survey, an activity directed by the themes, attitudes and beliefs expressed in the homeowners' in-depth interviews. This quantitative data was then used to validate and quantify the relationships and interactions between factors in the substantive decision theory that influence bushfire preparation.

The triangulation approach in mixed methodology is used in Chapters three and four. Chapter three provides a basic outline of the levels of household preparation in Hobart and Sydney, and the primary information source was the householder preparedness surveys. In the surveys homeowners were asked to indicate what preparations they had made around their homes. Qualitative data was also used here to cross check householders' self-reported preparation from the surveys.

In Chapter 4 triangulation is used to develop a suite of factors that influence preparedness decision-making that is based on results from both qualitative and quantitative data sets. Analysis of the qualitative data identifies logical themes and ideas that interviewees feel are influencing their decision-making. While analysis of the survey data identifies factors that have a quantifiable influence on decision-making, these factors don't always make sense. So while quantitative results may support findings from the qualitative data, it is important to view quantitative results in light of the qualitative findings in order to draw logical, commonsense conclusions from this data.

2.1.3 Research chronology

Figure 2.1. Research chronology

A generalised outline of the research chronology is provided in Figure 2.1. The initial qualitative interviewing provides the foundation on which quantitative surveys are developed for the collection of survey data. Interviews identify key themes that are likely to be influencing preparedness decision-making. Data from the first wave of surveys were analysed and a second group of interviewees was recruited from the survey respondents. Qualitative data from these interviewees was used to develop a theory of bushfire preparedness decision-making, which was then compared with qualitative data collected during the pilot interviews. In light of the preceding qualitative and quantitative analyses, surveys were redeveloped to address themes that were influencing the bushfire preparedness decision. Data from the second wave of surveys were finally used to validate the substantive theory of preparation decision-making that has been developed.

2.1.4 A brief note on "Community"

The term *community* means different things to different people. Of central importance when studying issues associated with the community is understanding what causes groups to have the character they do, and making examinations in light of these characteristics (Cottrell, 2008) – many of which may have a dramatic influence on the way people in those groups behave. The term "community" is mentioned regularly in this thesis, and so requires some description in the context of this work. In general, it is used to describe a group of people who share an interaction.

Some see the community as those people living in a particular geographical location or jurisdictional area, where grouping occurs purely by physical association; others view the community in a more social sense, grouped by similarities of belief, culture or interests. Bell and Newby (1971) categorise these two groupings into communities of *place* (locational) and communities of *interest* (relational) respectively. Elias and Scotson (1974) point out that whether or not individuals develop communities because of work, spiritual or lifestyle connections, or if these connections develop because people live near one another, the *community* (*Gemeinschaft*) is a network of relationships and interdependencies that individuals rely on, enjoy and put trust in (Tönnies, Harris, & Hollis, 2001). In this sense, communities are social entities describing groups of people bound together by the commonalities they recognise – people are therefore likely to be members of a "mosaic" of communities (Marsh & Buckle, 2001), both locational and relational. Several studies (Paton*, et al.*, 2008a; Paton*, et al.*, 2006a; Prior & Paton, 2008) have demonstrated the role *community* plays in the diffusion, interpretation, understanding and implementation of bushfire preparedness activities and information. Even so, people may also be unaware they even belong to a "community", and in these cases "membership may not equal obligation" (Marsh & Buckle, 2001, p. 5). Understanding how *community* affects the mechanics of these relationships is extremely important in an emergency management context, and Cottrell (2005) notes that the complexity of the individual's involvement in a variety of communities makes it difficult to be prescriptive about how to work with the community members, but has identified means by which some of the issues associated with this complexity may be addressed (namely community profiling, which involves a dedicated examination of community characteristics as part of the risk management process, see Cottrell, 2008).

In the context of bushfire risk management, *community* is largely a question of geography: what locations are at risk? Who lives there? How do we protect them or help them to protect themselves? So it would be sensible to consider that bushfire preparations should be discussed or addressed in a locational context – and such is the manner of most bushfire preparedness information or education campaigns. Surely people living near one another in an area of high bushfire risk recognise that risk and work together to mitigate it? Yet, in the context of bushfire preparedness, concentrating on location to define communities at risk is

problematic, because not all people recognise that risk and act to mitigate it (Barnett & Breakwell, 2001; Cox*, et al.*, 2003; Fischhoff*, et al.*, 1982; Hill & Thompson, 2006; Lee*, et al.*, 2005; Owen*, et al.*, 1999; Paton, 2006a; Paton*, et al.*, 2006b; Slovic, 1986), and consequently may not share the keenness to prepare that other members of their neighbourhood might display.

It is equally, if not more plausible that relational communities come together around a shared concern about bushfire, which extends to an interest in addressing that concern. In this context, relational communities may overlap with locational communities, but may also draw other people who share their bushfire-related interests (including friends or family) into their group, which broadens the information, experience and advice available to the community. It is also likely that these relational communities are more beneficial for individuals (Bell & Newby, 1971) in terms of information dispersal, resource sharing and the like (Putnam, 2000; Rogers, 1995; Tönnies*, et al.*, 2001), because these groups come together of their own volition and with a certain purpose. While communities of place may also be beneficial to the individual, involvement may nevertheless be foist onto the individual (Flora, 1998; Völker, Flap, & Lindenberg, 2007) – in the case of bushfire, people not interested in preparing (or with little knowledge about the necessity to prepare) may take part in these groups for social desirability reasons (Carroll*, et al.*, 2005; Collins, 2005; Martin, Bender, & Raish, 2007; Steelman & Kunkel, 2004; Zaksek & Arvai, 2004), rather than in order to make a significant contribution, or to benefit from their involvement.

In this thesis two broad-scale “communities”, Hobart and Sydney, are examined in the context of bushfire preparedness. Of course both locations comprise many hundreds of locational and relational communities. In Hobart and Sydney many suburbs have been surveyed covering several thousand households – large groups of the respondents may share geographic proximity, but very few are likely to share the same relational group memberships. To place this research, and particularly the results obtained, in the context of these two locations, brief descriptions of the demographic characteristics in Hobart and Sydney are provided (in the interests of brevity, detailed descriptions of each of the suburbs examined in Hobart and Sydney can not be provided here). All statistics described below were obtained from the Australian Bureau of Statistics (Hobart data updated February 2008, Sydney data updated

October 2007). Descriptions of social capital for Tasmania and New South Wales (adapted from Trewin, 2006) are used generally to place community characteristics and demographics into a “sense of community” context.

2.1.4.1 Hobart

While Hobart is the capital city of Tasmania it is relatively small and regional in nature. Greater Hobart has a population of approximately 209,287 (2008) inhabitants (see table 2.1 for a summary of demographics). It is located in the south-eastern quadrant of Tasmania, making it reasonably distant from other large cities in Australia. The population is relatively older than the national average, with 26.1% of the Hobart population 55 years or older. Only 12% of the population has been born overseas, and 89.9% speak only English in the family home. The median household income of $904/week is less than the national average ($1027/week). More than half of the population (57%) identify as practising some form of religion.

2.1.4.2 Sydney

Sydney is an international city, attracting immigrants from all parts of Australia and many countries, and it is more than 20 times larger than Hobart in terms of population (4.34 million in 2008). Termed a “gateway” city by Ley (2001), Sydney can be characterised by huge population diversity in culture, lifestyles and community structure (see table 2.1). Almost three times more Sydney inhabitants were born outside of Australia (31.7%) compared to Hobart (12%). The median age in Sydney is 36.6 years. Although the median household income in Sydney is higher than in Hobart, the proportion of homeowners in Hobart is higher. Housing turnover in Sydney is slightly higher than in Hobart, with 44.5% of residents living at a different address five years prior to the 2006 census date.

Table 2.1. Selected demographic characteristics of Hobart and Sydney.

	Sydney	Hobart	Australia
Population	4,119,190	200,525	21,758,122
Median household income ($/week)	1154	904	1027
Home is fully owned or being purchased (%)	61.2	68.1	64.8
Home is rented (%)	29.7	25.4	27.2
Lived at a different address as five years previously (%)	44.5*	40.9*	45.1
Lived at a different address as one year previously (%)	18.1*	18.1*	18.7
Usually speaks a language other than English at home (%)	19.8*	3.0*	16.0
Speak only English at home (%)	64	89.9	78.5
Born overseas (%)	31.7	12	23.1
Born in Australia (%)	60.4	81	70.9
Median age (Years)	36.6	38.4	36.4
Proportion of population aged over 55 years (%)	22.5	26.1	24.3

2.1.4.3 Social Capital: Tasmania and New South Wales

The Australian Bureau of Statistics (ABS) has developed a framework document (*Information Paper: Measuring Social Capital, an Australian Framework and Indicators)* detailing mechanisms for measuring social capital in the "Australian community" (Edwards, 2004). Trewin (2006) has drawn together statistical information available from various ABS sources that match a relatively small number of the indicators described by Edwards (2004), which reflects the relative novelty and difficulty inherent in measuring social capital in a meaningful fashion. This information can also be used only as a proxy for describing the strength of locational communities in Australia. Nevertheless, a brief outline of some aspects relevant to social capital in Tasmania and New South Wales is given below, concentrating particularly on trust, reciprocity and community support. The results are summarised in table 2.2.

Trust is a fundamental aspect of a well-functioning community (Forrest & Kearns, 2001; McMillan & Chavis, 1986; Portes, 1998; Putnam, 2000), because individuals in a community hope that the other members conform to accepted social values and norms (Möllering, 2001; Siegrist & Cvetkovich, 2000; Slovic, 1999; Van Swol & Sniezek, 2005). The importance of trust has also been established in the context of risk communication, and particularly in the public's acceptance and implementation of risk mitigating behaviour (Paton, 2007b, 2008b;

Paton*, et al.*, 2008b; Prior & Paton, 2008; Siegrist & Cvetkovich, 2000; Van Swol & Sniezek, 2005). In order to gauge the level of trust in Australian states, Trewin (2006) uses an indicator of trust: people's feelings of safety while home alone. The assumption here is that people enjoying good relations with their neighbours are likely to report feeling safer at home alone. Although this indicator of trust may be a relatively good proxy for general estimations of trust in social capital, it may be a less effective means of estimating trust in the context of bushfire risk management and mitigation.

Based on results from the 2002 General Social Survey (conducted by the ABS) Trewin (2006) found that Tasmanian and New South Wales residents were equally as likely to feel unsafe in their homes after dark. He also notes that 10 per cent of individuals born overseas were likely to report feeling unsafe at home alone after dark.

Table 2.2. Indicators of social capital in Tasmania and New South Wales (adapted from Trewin, 2006).

	Year	NSW	Tas.	Aust.
Had contact with family and friends living outside the household in the previous week (%)	2001	94.8	96.5	95.4
Primary carer for person with a disability %	2003	2.3	3.1	2.4
Cared for a person with a disability %	2003	11.4	14.8	13.0
Had undertaken voluntary work in the last 12 months %	2002	33.4	37.0	34.4
Participated in social activities in the previous three Months (%)	2002	90.8	91.1	92.2
Made a donation in previous 12 months %	2000	69.0	75.6	74.2
Person and/or partner provide support to other relatives living outside the household (%)	2002	27.8	25.9	26.9
Could ask for small favours from persons living outside the household (%)	2002	92.4	95.3	93.3
Could ask for support in time of crisis from persons living outside the household (%)	2002	93.2	96.0	94.0
Felt unsafe at home alone during the day %	2002	3.0	2.2	3.0
Felt unsafe at home alone after dark %	2002	7.4	7.4	8.4

Reciprocity is another key determinant of social capital within communities (Forrest & Kearns, 2001; McMillan & Chavis, 1986; Morrison, 2003; Simmel & Wolff, 1964), which describes the mutual give and take relationships that are evident in a healthy, functioning community.

Trewin (2006, p. 26) surmises that, “where reciprocity is the norm, people are more likely to be able to ask others for small favours, and expect people's support in a crisis”. As such he uses two measures to examine reciprocity, one’s ability to ask small favours of others and the ability to ask for support in times of crisis (data for both measures was obtained from the 2002 General Social Survey). Both measures are clearly relevant in a community bushfire preparedness scenario, for example, where householders are likely to seek assistance in making preparations and in defending their home in the case of direct bushfire threat (Paton*, et al.*, 2008a; Paton*, et al.*, 2006a).

Results from Trewin’s (2006) analyses of the General Social Survey data suggest New South Wales residents are least likely to ask their neighbours for small favours and least likely to get support in times of crisis. By contrast, Tasmanian residents were most likely to feel they could ask for small favours, and for support in a crisis. The results also suggested that people living in the major Australian cities were less likely to feel they were able to ask for small favours but there is no distinction between Sydney and Hobart as to whether both are considered “major cities”.

Another important factor examined by Trewin (2006), which may be applicable in a community bushfire preparedness context, is the level of community support (particularly volunteering work and caring) existing within a locational community. Community support is likely to reflect the level of reciprocity in a community, with individuals seeking ways to “give back to the community”, and Trewin (2006) notes that most respondents (47%) to the General Social Survey who indicated they took part in voluntary work did so to help others or their community. New South Wales residents were the least likely to participate in any form of formal volunteer work, while Tasmanians were the second most likely to volunteer (after South Australian residents). While these results are indicative of participation rates, higher proportions of older residents in both Tasmania and South Australia are likely to push up the numbers of people formally volunteering (at least in an old-age caring sector).

While these indicators point to some measurable differences in the social capital (and possibly the nature of *community* in these places) in Tasmania and New South Wales, they are by no means conclusive. However, the nature and characteristics of Hobart and Sydney, and the clear differences between the cities, is likely to result in the type, quality and

characteristics of those communities existing within (and about) both locations. For example, differences in choices regarding living in peri-urban areas (financial or lifestyle), quality of life, job-life balance, commuting times and many other factors will undoubtedly result in differences in bushfire preparedness between the locations.

2.1.5 Research ethics

The research conducted during the course of this doctoral thesis received human ethics approval through the Human Research Ethics Committee (Tas) Network, constituted by joint agreement between the University of Tasmania (UTas) and the Tasmanian Government Department of Health and Human Services. The research was approved under minimal ethics reference number H0008910.

2.2 Qualitative Data

For the sake of brevity, the following discussion aggregates the two qualitative steps in the research process.

2.2.1 Interview schedule and pilot study

The interview schedule (Appendix A) was designed to allow a semi-structured approach to the collection of interview data. The objective of the interviews was to identify factors from people's own accounts of their circumstances that may influence their attitudes and beliefs about bushfire and bushfire risk mitigation. The semi-structured interview provides a mechanism for eliciting these accounts, but also allows the interviewee to freely discuss in a conversational way other ideas they feel are important personally.

The interview schedule used in the pilot study (January 2006) and research interviews (March/April 2007) was based on the schedule developed by Paton *et al.* (2006) and also used by Paton *et al.* (2008a). The pilot group were selected from a pool of possible interviewees identified during the research conducted by Paton *et al.* (2006a), but not included in that research. The schedule was used primarily as a guide to direct the interview, and ensure that the interviewee (and interviewer) remained on topic. Ten questions were used; they asked about bushfire risk perception, whether the interviewee prepared, how, when, why and what the interviewee did to prepare, where the interviewee sourced

information about preparing, and how reliable they felt this information was. Using the schedule as a guide for the interview was important for later comparison between interviewees, but enabled the interviewer a degree of flexibility during the interview that permitted further exploration of themes raised by the interviewee that were deemed important.

The pilot study was particularly important for this research because of the need to identify key themes for the development of the questionnaire. Seventeen pilot interviews were conducted with householders living in the Fern Tree and South Hobart areas of Hobart. This data was transcribed and analysed (using the same techniques as described below in section 2.2.4), and used to develop the questionnaire distributed prior to the subsequent bushfire season. The pilot study identified the key ideas, attitudes, beliefs and themes regarding bushfire threat and preparedness to determine what questions would be included in the questionnaire, but also provided a starting point for elucidating a bushfire preparedness decision-making theory. These interviews formed the basis on which further qualitative and quantitative data would be collected.

2.2.2 Interviewee recruitment

Data on people's attitudes to, beliefs about and ideas regarding bushfire preparation were gathered using semi-structured interviews. Interviewees were recruited using a theoretical sampling technique (as utilised by Paton *et al.*, 2006), where a separate informed consent form for the interview was attached to the end of the questionnaire (see Appendix B, p18 and Appendix C, p15), and prospective interviewees were asked to fill out their details (name, date, contact number and preferred contact time) and sign their consent to be contacted by telephone. Although apparently retrospective in nature (conducted after the distribution of questionnaires), this technique allows the identification of a vastly greater number of appropriate interviewees than would be possible by cold-calling households in the sampling locations. In order to develop a testable theory of bushfire preparedness, all interviews were transcribed and analysed prior to examining the data collected from the questionnaires.

All questionnaires in which respondents provided consent to be contacted for an interview formed a pool of prospective interviewees that was sorted on the basis of whether those

interviewees intended to prepare, or to seek information about preparing (based on research conducted by Paton *et al.*, 2006 intention to prepare and intention to seek information predicted actual preparation). Sorting questionnaires into these categories allowed prospective interviewees to be contacted using a purposive sampling technique (Flick, 2006; Mook, 2001), which ensured a good cross-section of interviewees ranging from those people who prepared extensively, to those people who did not prepare at all. Such a broad cross-section allowed a deep exploration of the way people consider bushfire hazard and make decisions about how to mitigate their bushfire risk. The purposive sampling approach also increased the opportunity to compare the underlying conditions, patterns of interaction, means by which situations were dealt with, and the consequences associated with each preparation outcome (Flick, 2002, 2006).

2.2.3 Interviewing

Research interviews were conducted at the official (based on the Tasmania Fire Service determination) end of the bushfire season in March and April 2007. Timing the interviews in this way allowed the interviewees to discuss their bushfire preparation with respect to the recent bushfire season and reflect on the preparatory actions they took (or didn't take) based on their stated intentions identified when they completed the bushfire preparedness questionnaire (October/November 2006).

Prospective interviewees were contacted systematically based on the categorisation referred to above, generally in the evenings (unless otherwise specified on their interview informed consent form). The researcher identified himself and the reason for calling before asking the prospective interviewee if they were still interested in being interviewed, and whether the time of the call suited them. If the time was inconvenient, but the prospective interviewee was interested in participating, future arrangements were made.

All interviews were conducted over the telephone and interviewees were first asked for permission to record the interview (all prospective interviewees who wished to be interviewed agreed to the interview being recorded). All interviews were recorded through the telephone line using a telephone adapter (JNC Digital) connected to a 30G iPod (Apple Inc.) with a MicroMemo (XtremeMac) voice recorder. Interviews lasted between 30 and 90 minutes.

The number of interviews conducted was determined based on the richness of the information resulting from the interviews. Interviewing continued as long as new ideas, themes, attitudes or beliefs were encountered. Seventeen interviews were conducted in January 2006 (pilot) and 19 interviews were conducted in March and April 2007. Interview recordings were downloaded onto a personal computer for transcription.

2.2.4 Interview transcription and analysis

All interviews were fully transcribed directly into a Microsoft Word document using Express Scribe free transcription software (NCH Software). Interview files were imported from the word documents into NVivo version 7.0 (QSR International) for analysis.

All interviews were systematically analysed using grounded theory techniques as described by Strauss & Corbin (1990, 1998). Grounded theory methodology involves a four-step analysis, which was adhered to in this research. Firstly data were coded in NVivo 7.0 following the recommended procedures for open, axial and selective coding techniques to highlight key themes in the data. Data were then analysed to identify relationships between codes (themes) and thereby build concepts that reflected these relationships. Concepts were then aggregated based on broad similarities in order to subsequently generate a theory that explained the process individuals follow when deciding to prepare for bushfires. Grounded theory is a constant comparitive method of systematic qualitative data analysis that allows the researcher to create networks among the concepts that emerge from the data (Strauss & Corbin, 1998).

Coding of the data was undertaken in three stages. In the first stage all interview transcripts were coded and new codes were identified on an ongoing basis. In the second stage, all interviews were reviewed and re-coded using the whole suite of codes identified by the completion of the first coding phase. The third phase was used to re-check that codes were assigned to the data accurately. Coding was then checked at random by an independent reviewer to verify coding accuracy.

All interviews from the pilot study and research were transcribed and analysed using the method described above. Comparisons between these two sets of data identified strong similarities, and because the same interview schedule was used in both instances, the

interview data was pooled, providing a larger sample (36 interviews) from which to develop a theory describing householders' bushfire preparedness decision-making. This process contributed to the design of the quantitative surveys described below.

2.3 Quantitative Data

2.3.1 Survey response

Of the 1500 surveys distributed in the Hobart area during the 2006 bushfire season, 499 were returned (33.2%). Of the 1297 surveys distributed in the Hobart area during the 2007 bushfire season 399 were returned (30.7%), and 277 of the 1500 distributed in Sydney were returned (18.5%).

2.3.2 Bushfire preparedness survey content

Quantitative data were collected using a longitudinal A3 booklet survey distributed early in the bushfire seasons of 2006 (Appendix B.), and 2007 (Appendix C.). The survey in the second wave of sampling (2007) was slightly shortened from the previous wave after several measures were found either to be unimportant in predicting bushfire preparedness, or the measures were found to be psychometrically invalid. All measures used in 2006 are discussed (below). Each survey contained an information sheet with details of the research, researchers, and contact details of the UTas Human Ethics Officer. Informed consent was assumed on receipt of a survey. At the end of the survey, respondents were asked whether they were interested in contributing further by completing a telephone interview about their preparedness. They were asked to provide contact details with a suitable time for the researchers to call. A detailed methodology associated with the qualitative data collection is provided in section 2.2.

The bushfire preparedness survey (2006) was developed using established measures from the hazard preparedness literature, in particular from research conducted by Paton, Kelly, Burgelt and Doherty (2006a), and utilised additional measures derived from results of the pilot study for this thesis research aimed at identifying specific factors that may influence household bushfire preparedness in Australia, and which may not have been examined previously in the literature. The pilot study was carried out in January 2006. Seventeen in-

depth telephone interviews with householders living in known bushfire risk areas around Hobart, Australia (primarily in the suburbs of Fern Tree and South Hobart). The survey also sought information on: how long householders had resided where they do; length of time in present house; whether they own or rent their home; and other general demographic characteristics, as these are known to influence householder preparedness (McIvor & Paton, 2007; Paton, 2006b; Paton*, et al.*, 2006a).

The objective of the first wave of surveying was to assess a broad variety of variables either known to influence preparedness (*e.g.* risk perception, critical awareness, sense of community) or believed to influence preparedness (*e.g.* bushfire experience, preparation inhibition). Many of the variables covered during the 2006 survey have not been assessed in the context of bushfire preparedness in the past, and consequently their importance in influencing preparedness was unknown. Following the completion of the 2006 survey season, each question was tested for its psychometric validity and internal reliability. If found to be valid and reliable, the role of the variable in predicting preparedness was determined using multiple regression (measure testing, data cleaning and variable suitability are described in more detail in section 4.2.4). Those variables found not to be valid or reliable, or that did not influence preparedness were removed from the questionnaire distributed in the second wave of the survey (2007 bushfire season). Questions that were excluded from the 2007 survey included: burning off, volunteerism, social norms, and some items of the bushfire experience question. The reasoning behind the removal of some of these variables is provided in the preparedness context chapter (3). The items scored in each question (listed below) can be viewed in Appendix B, *'Community responses to bushfire threat: Risk perception and preparedness' – 2006*. Questions used in the 2007 bushfire season are provided in Appendix C, *Community responses to bushfire threat: Risk perception and preparedness' – 2007.* The order of questions in the survey was altered in 2007 to prevent the possibility of recurring patterns in non-response to questions towards the end of the survey.

2.3.1.1 Critical Awareness (Q4)

Critical awareness is an important precursor that motivates community action (Dalton, *et al.*, 2001; McGee & Russell, 2003). The measure describes the extent to which individuals talk

and think about a hazard (Paton, 2003). The more an individual thinks about or discusses an issue with family, peers or their community, the more likely they will be to act to confront that issue (Paton, *et al.*, 2005). The inclusion of critical awareness reflects the importance of the link between decision-making and the way people think and communicate with one another about important issues in their lives (Hardin & Higgins, 1996).

Respondents were asked to rate the frequency they thought about or talked about bushfires on a 5-point scale, with 5 = once a week or more, and 1 = never.

2.3.1.2 Risk Perception (Q5)

Risk perception is another important precursor that motivates hazard preparedness (Johnston, *et al.*, 1999; Paton, *et al.*, 2005; Sjöberg, 2000). Unless an individual perceives they are threatened by a hazard they are unlikely to respond by taking actions that reduce or mitigate that threat (Paton, 2006b).

Respondents were asked to rate their individual perception of risk on a 5-point scale, with 5 = strongly agree, and 1 = strongly disagree.

2.3.1.3 Community Risk Perception (Q6)

Unlike other natural hazards (such as volcanoes and earthquakes) effective community preparedness for bushfire requires a mix of both individual and community preparation (Paton*, et al.*, 2006a; Paton*, et al.*, 2006b). For this reason it is important to establish how individuals perceive the bushfire risk to their communities. Like the risk perception measure, the importance of this measure lies in the link between perceiving risk and doing something to reduce that risk.

Respondents were asked to rate their community's perception of risk on a 5-point scale, with 5 = strongly agree, and 1 = strongly disagree.

2.3.1.4 Bushfire Frequency (Q7)

Generally, people are more likely to adopt protective behaviours (like preparing) when they are faced with frequently occurring risks (Fischhoff, *et al.*, 1982; Sjöberg, 2007; Slovic, 1987). The seasonality of bushfire in Australia means that each bushfire season many Australians

are exposed directly or indirectly (through the media for example) to bushfire, and its aftermath. As such, this measure (adapted from Paton *et al.*, 2006) is included to assess householders' perceptions of the frequency of bushfire in their area.

Respondents were asked to rate their perceptions of bushfire frequency on a 5-point scale, with 5 = strongly agree, and 1 = strongly disagree.

Question 8 follows from the bushfire frequency measure, and asks the respondent to estimate the timeframe in which they believe they'll next be affected by bushfire. If a respondent doesn't feel they are likely to be affected by bushfire in the near future, then it's likely that their interest in adopting protective behaviours will be low. This question was added because results from the pilot study suggested it was an important predictor of bushfire preparation. This measure was assesed on a 4-point scale, with 1 = in the next three months, and 4 = longer than three years.

2.3.1.5 Bushfire Experience (Q9)

This measure was included based on results from the pilot interviews. While many interviewees spoke about how important they thought experience of bushfire would be in influencing their preparedness (and many stated their own examples), other interviewees suggested that particularly bad experiences (like losing a home to a bushfire) had made them less likely to prepare. This measure aimed to gain an objective account of householders' experience of bushfire, when that experience occurred, whether damage or loss was part of the experience, and whether family, friends or other members of the community had experienced fire. Because individuals reflect on and learn from experience in different ways, it is difficult to ascertain exactly how experience influences preparedness. By including this measure in the survey the researcher hoped to shed some light on the role of experience in increasing the adoption of protective behaviours.

Respondents were asked whether they had experienced fire and when; whether they'd been injured by bushfire, or lost property; and, whether family, friends or others in their community had experienced fire.

2.3.1.6 Outcome Expectancy (Q10)

Outcome expectancy refers to beliefs relating to the efficacy of preparedness measures in actually reducing risk and increasing safety in the event of hazard activity (Duval & Mulilis, 1999; Lasker, 2004; Lindell & Perry, 2000; Mulilis & Duval, 1995; Paton, 2003; Paton*, et al.*, 2005). It has been shown that people with positive outcome expectancy are likely to make more significant investments in protective behaviours (Paton, 2003). The inclusion of a measure of outcome expectancy in the survey reflects this measure's importance, especially when examining hazards with potentially catastrophic consequences (McClure, *et al.*, 1999) like bushfires.

Respondents were asked to rate their bushfire outcome expectancy on a 5-point scale, with 5 = strongly agree, and 1 = strongly disagree.

2.3.1.7 Burning Off (Q11)

This question was included after analysis of the pilot interview data suggested that the act of burning off, when carried out by local fire or civic authorities, encouraged preparation by increasing critical awareness about the bushfire season. The connection between burning off and preparation occurred because the presence of smoke in the air caused people to start thinking and talking more about the fires, and the pending bushfire season. The items in the question reflected the main concepts identified in the pilot interviews.

Respondents were asked to rate their beliefs about burning off on a 5-point scale, with 5 = strongly agree, and 1 = strongly disagree.

2.3.1.8 Responsibility for Hazard Preparation (Q12)

Current bushfire preparedness policy (AFAC, 2005) identifies the role that community members must play in preparing, and acknowledges the (possible) inability of fire service personnel to ensure the protection of all people living at risk from bushfire. For these reasons fire management agencies now promote the importance of individual responsibility in ensuring the home is prepared. Research has shown that homeowners often transfer their responsibility onto emergency management agencies (Ballantyne*, et al.*, 2000; Johnston*, et al.*, 1999; Mulilis & Duval, 1995; Paton*, et al.*, 2000a), and in these situations are unlikely to

recognise their responsibility in these activities. This question aimed to gauge the level of householder responsibility as a predictor of bushfire preparedness.

Respondents were asked to rate their responsibility on a 5-point scale, with 5 = strongly agree, and 1 = strongly disagree.

2.3.1.9 Self-efficacy (Q13)

Self-efficacy provides a measure of an individual's capacity to act when confronted by a natural hazard (Duval & Mulilis, 1999; Lindell & Whitney, 2000; Paton*, et al.*, 2006a). Self-efficacy has been included in the survey because of the link established between it and the likelihood that an individual will place effort in and persevere with risk reduction behaviours (Bennett & Murphy, 1997; Paton, 2003).

Respondents were asked to rate their self-efficacy of risk on a 5-point scale, with 5 = strongly agree, and 1 = strongly disagree.

2.3.1.10 Action Coping (Q14)

Action coping is a measure of an individual's problem solving beliefs – how capable they feel they are when dealing with problems in their lives. The measure used here is derived from Carver, Scheier & Weintraub (1989), and has been implicated as a predictor of hazard preparedness (Bishop, *et al.*, 2000; Carver, *et al.*, 1989; McIvor & Paton, 2007).

Respondents were asked to rate their everyday problem solving competencies on a 4-point scale, from 1 = I usually don't do this at all, to 4 = I usually do this a lot.

2.3.1.11 Intention (Q15)

"Intentions provide valuable insights into how people are reasoning about their relationship with hazards" (Paton *et al.*, 2006, p.572). The measure of intention used here is derived from Paton, Smith, Johnston, Johnston & Ronan (2004), and comprised two sub-scales, one for 'intention to prepare' and the second for 'intention to seek information'. When preparing for bushfires, Paton *et al.* (2006a) identified that individuals who formed an intention to prepare were likely to convert their intentions to the adoption of protective behaviours, while those with an intention to seek information were less likely to undertake preparations.

People's intentions regarding bushfire preparation were assessed based on the likelihood they would carry out each item. This measure was rated on a 3-point scale, with 1 = no, and 3 = definitely.

2.3.1.12 Perceived Preparation (Q16)

Individuals often overestimate the extent of their preparations (in relation to other members of their community), and the effectiveness of the preparations they have made (Paton, 2006b). Under these circumstances people are likely to dismiss making further (necessary) preparations because they feel they are sufficiently prepared. As such, gaining an understanding of householders' perceptions of their preparedness is important when trying to appreciate actual levels of preparation.

Perceived preparation was measured as the level to which an individual believed they were prepared, and was rated on a 5-point scale, with 1 = not prepared at all, to 5 = very prepared.

2.3.1.13 Volunteerism (Q18)

This measure was developed based on results from the pilot interviews. Many of the interviewees suggested that being a bushfire-fighting volunteer, having social connections to bushfire-fighting volunteers, or the presence of a volunteer fire brigade in the community increased their awareness of bushfires, and encouraged their preparation.

Volunteerism was measured based on how much an individual was involved in bushfire management within their community. It was measured on a 5-point scale, with 1 = heavily involved, and 5 = not at all involved.

2.3.1.14 Sense of Community (Q19)

Sense of community has been shown to be a predictor of hazard preparedness (Bishop*, et al.*, 2000; Duval & Mulilis, 1999; Paton*, et al.*, 2008a; Paton*, et al.*, 2001b). In particular, Paton *et al.* (2000a) showed that people with low sense of community did not translate an intention to prepare into the adoption of protective behaviours. The measure used here is adapted from Bishop *et al.* (2000), and represents a simplified version of the Sense of Community Index (SCI - Long & Perkins, 2003; McMillan & Chavis, 1986).

Respondents were asked to rate their sense of community on a 5-point scale, with 5 = strongly agree, and 1 = strongly disagree.

2.3.1.15 Community Participation (Q20)

Empowering communities through community participation in natural hazard risk management has been shown to increase community capacity, confidence and self-reliance (Newport & Jawahar, 2003). Community participation as a consequence has been identified as a predictor of disaster mitigation strategies (McGee & Russell, 2003; Pearce, 2003; Tierney*, et al.*, 2001). The measure of community participation included here has been adapted from Paton *et al.* (2006a). For the second wave of the survey (2007 bushfire season) two more measures of community participation (designed to improve the reliability of this variable) were included.

Community participation was measured with 1 = yes, 2 = no responses.

2.3.1.16 Collective Efficacy (Q21)

Because effective bushfire preparedness requires a mix of individual/household and community action, assessing the ability of the community to interact and act collectively in the face of a hazard threat or hazard activity is known to influence the adoption of mitigation strategies. This measure of collective efficacy is adapted from Paton *et al.* (Paton*, et al.*, 2008a).

Respondents were asked to rate their community's collective efficacy on a 5-point scale, with 5 = strongly agree, and 1 = strongly disagree.

2.3.1.17 General Trust (Q22)

Trust can play an important role in predicting hazard preparedness by individuals (Paton, 2007b, 2008b; Paton*, et al.*, 2008b; Siegrist & Cvetkovich, 2000), particularly when messages about the adoption of protective behaviours are disseminated by civic agencies (Slovic, 1993; Van Swol & Sniezek, 2005). This measure of general trust (in civic agencies, community leaders, law and the media) is adapted from Paton *et al.* (2006a).

Respondents were asked to rate their general trust on a 5-point scale, with 5 = strongly agree, and 1 = strongly disagree.

2.3.1.18 Social Norms (Qs23-28)

The items in the social norm scale measure the extent to which an individual believes adopting protective behaviours would be viewed favourably or unfavourably by significant others (such as family, friends, work colleagues and the general community). McIvor and Paton (2007) showed that people living in situations where protective behaviours were advocated socially, increased the likelihood that respondents would undertake protective behaviours themselves. This measure was adapted from Paton *et al.* (2006a) and McIvor & Paton (2007).

Social norm questions were measured using a variety of 5-point scales: 5 = very likely, 1 = very unlikely, on questions 23, 24 and 28 where respondents were asked to rate the likelihood that they would follow the actions or advice of significant others; 5 = strongly agree, 1 = strongly disagree, on questions 26 and 27 where respondents were asked what they thought significant others would think about their actions; and, 5 = very strongly, 1 = not at all strongly, on question 25 where respondents were asked how influential significant others in their lives are.

2.3.1.19 Australian Fire Knowledge (Q29)

The research conducted by Paton *et al.* (2006) aimed in part to determine respondents' level of knowledge about bushfire in the Australian environment. It was hypothesised that greater bushfire knowledge would increase critical awareness about bushfires and correlate positively with a proclivity toward bushfire preparation. This measure was incorporated into the current survey to maintain continuity between the research conducted by Paton *et al.* (2006) and the present research.

Respondents were asked to rate their knowledge of bushfire in Australia on a 5-point scale, with 5 = strongly agree, and 1 = strongly disagree.

2.3.1.20 Resources (Q30)

Another important concept identified during the pilot interviews was the householders' reliance on possessing resources that could assist the adoption of protective behaviours. Householders believed having information that was specific to preparations was a key factor determining whether they would actually prepare. For this reason this measure was incorporated into the survey.

Respondents were asked to rate their access to resources they required for preparing on a 5-point scale, with 5 = strongly agree, and 1 = strongly disagree.

2.3.1.21 Preparedness (Q31)

This measure of preparedness, based on criteria described by Paton *et al.* (2004), was altered by Paton *et al.* (2006) specifically to examine household bushfire preparedness. The measure is based on general hazard preparedness items drawn from an earthquake preparedness scale developed by Mulilis, Duval & Lippa (1990), and from a review of the recommended actions for safeguarding self and property against bushfire (Paton *et al.*, 2006). Care has been exercised in the development of this scale to limit the chance of including items that have multiple functions, or which may reflect different decision processes (to those involved in preparing), so that the level of preparedness is not overestimated or analysis confounded by respondents misinterpreting the questions (Paton, Smith, & Johnston, 2003). A preparation score for each respondent was obtained by summing the item responses, this score was used as the dependent variable in all analyses concerning bushfire preparedness.

All preparedness items (54) were rated on a 3-point scale (3 = have done this, 1 = will not do this) that measured the likelihood respondents would effect each behaviour.

2.3.1.22 Preparation Inhibitors (Q32)

This measure was adapted from Paton *et al.* (2006) and its importance in predicting preparedness was also established during the pilot interviews. While many people form an intention to prepare for bushfires, preparatory inhibitors (time, cost of preparing *etc*) often prevent the conversion of these intentions into action.

The importance of preparation inhibitors was assessed based on how much the respondent thought each item would prevent them from preparing. Preparation inhibitors was measured on a 5-point scale, with 1 = not at all, and 5 = a great deal.

2.3.1.23 Lifestyle (Q33)

Qualitative analyses by Paton *et al.* (2006) showed that people with strong attitudes to environmental protection were unlikely to make substantial changes around their properties that would involve burning off or clearing vegetation. Often these types of people derive great pleasure from living close to nature and the bush, and identify that the choice to live close to the bush places them at risk from bushfire, but this cost is outweighed by the benefits derived. As such, the link between lifestyle and the adoption of protective behaviours has been identified (Brenkert-Smith, *et al.*, 2006; Jakes, 2002; Nelson, *et al.*, 2005; Nelson, Monroe, Fingerman Johnson, & Bowers, 2004).

Respondents were asked to rate their reasons for living close to the bush on a 5-point scale, with 5 = strongly agree, and 1 = strongly disagree.

2.3.1.24 Visitation to the Bush (Q34)

This question was adapted from Paton *et al.* (2006) and provides a measure of the regularity a respondent visits the bushland around them as a proxy for the value they place on having access to natural bushland. Accessibility of bushland may contribute to individual wellbeing, which may in turn influence that individual's attitude about the adoption of protective behaviours that might lower the value of the surrounding bushland.

Respondents were asked to score the frequency they visit the bushland around them on a 6-point scale, with 1 = one or more times a week, and 6 = never.

2.3.1.25 Consistency of Risk Information (Q35)

Consistency of risk information has implications relating to trust (Paton, 2008b; Paton*, et al.*, 2008b; Siegrist & Cvetkovich, 2000; Van Swol & Sniezek, 2005). Inconsistencies between official risk messages influence the way people act on those messages, and as a consequence, can reduce the effectiveness of those messages.

Respondents were asked to rate their perceptions of how consistent bushfire information was on a 6-point scale, from 1 = I have not heard anything, to 3 = fairly consistent, to 6 = inconsistent.

2.3.1.26 Bushfire Media Reporting (Q36-38)

While risk management agencies provide accurate information in risk communication messages, the efficacy of the content of these messages can be influenced positively or negatively by media reporting of natural hazards (Jacobson, Monroe, & Marynowski, 2001; Miles & Morse, 2007; Wåhlberg & Sjöberg, 2000). Establishing the value respondents place on the information derived from the mass media, and obtaining a subjective estimate of the reliability respondents place in this information can be useful in elaborating their reasoning behind either adopting or refusing to adopt protective behaviours. These measures were taken from Paton *et al.* (2006).

Respondents' perceptions of the reliability of bushfire related information coming from the media was rated on a 5-point scale, with 1 = very reliable, and 5 = not at all reliable.

2.4 Summary

This chapter has provided an outline of the data collected for this research, and how it was collected. Using both qualitative and quantitative techniques ensures a robust methodology, each collection style providing different but interacting and interdependent information about bushfire preparation and the decision to prepare. These different techniques have also determined the way in which the results of the research have been subsequently presented, which does not necessarily mirror the data collection or analysis processes. In order to provide a context in which to discuss bushfire preparedness decision-making, contextual results concerning preparedness are first presented and discussed in *chapter 3*. This then leads into the development of a testable bushfire decision theory in *chapter 4*, which is tested and validated in *chapter 5*. In light of the presentation and discussion of these results, the preparedness decision theory is then critically re-examined in *chapter 6*. As identified, the first step in this process is a contextual examination of preparedness, which is presented in the following chapter.

3. Bushfire Preparedness in Hobart and Sydney

3.1 Introduction

Preparing for bushfires is a key mechanism that at-risk householders are encouraged to employ to increase their resilience to bushfires, and improve their ability to recover after bushfire disaster (McGee & Russell, 2003; Paton, 2006b; Paton*, et al.*, 2008a; Rohrmann, 1999). Preparing for bushfire involves a variety of protective behaviours (for example, ensuring the home is secure against the entry of sparks, access to water and water hoses, access to metal buckets and ladders, ensuring important belongings are safe, and clearing combustible material from around the house), which are known to increase a home's defendability if bushfire threatens (AFAC, 2005; COAG, 2004; McLeod, 2003; Paton*, et al.*, 2008a; Paton*, et al.*, 2006a; Paton & Wright, 2008).

As population expansion brings people closer to bushfire-prone areas of Australia, communicating the need for householders to prepare is becoming ever more important. Paton (2006b, p. 1) recognises that "even if the probability and intensity of bushfire hazard activity remains constant, continuing population growth and economic and infrastructure development, particularly within the peri-urban environment, results in a concomitant increase in the potential magnitude and significance of loss and disruption associated with bushfire activity". At this point, however, population growth and development at the peri-urban fringe has not been matched by a coincident increase in levels of bushfire preparedness and awareness (McLeod, 2003), which generally remain low (McLeod, 2003; Paton, 2006b; Paton*, et al.*, 2008a; Paton*, et al.*, 2006a; Paton & Wright, 2008; Prior & Paton, 2008).

Following recent devastating fires, particularly the Canberra bushfires of 2003, encouraging householders and land managers to prepare their properties in anticipation of bushfire has become a serious public policy issue (McLeod, 2003). The Australasian Fire Authorities Council (AFAC) identifies in their most recent risk communication policy guidelines for fire management agencies Australia-wide, that bushfire regularly threatens communities in Australia, and that managing bushfire risk and reducing loss as a result of bushfire is a shared responsibility between government and householders:

> "Fire agencies and some land management agencies have statutory responsibilities for managing bushfires. However, the steps that householders take to prepare for bushfires are crucial to the protection of their life and property. Fire-fighting agencies will provide support and assistance during bushfires when and where possible, but their effectiveness will be compromised if people or properties are not adequately prepared for bushfire." (AFAC, 2005, p. 4)

The AFAC policy also recognises the importance of preparing the home regardless of whether a homeowner chooses to stay and defend or leave their property. It acknowledges that undertaking these protective behaviours not only enables the homeowner to safely defend their property (if they so choose), it also allows the fire management authorities to more effectively and safely defend that property if the homeowner has chosen to leave. Current bushfire risk communication in Australia is expected to mirror this policy, and aims to encourage all homeowners to firstly prepare their property, then decide whether they feel comfortable staying to defend it, or leaving the property to be defended by fire management authorities.

> "Properties should be prepared for bushfire regardless of whether the occupants intend to stay and defend their property or relocate to a place where they feel safer… An unprepared property is not only at risk itself, but may also endanger neighbouring properties if it contributes to a bushfire's intensity. Fire-fighters may not defend unprepared properties." (AFAC, 2005, p. 5)

However, identifying shared responsibility between agency and householder, as a policy issue, does not mean that it is necessarily enacted as such. Rather, this policy identifies a need to understand how people and agencies can engage in ways that contribute to better bushfire preparedness. This chapter examines bushfire preparedness in two distinct peri-urban locations in Hobart, Tasmania, and Sydney, New South Wales. The objective of this chapter is to provide a contextual background for the thesis by describing the relationship between major demographic and social factors and householder bushfire preparedness. The chapter will examine the levels of bushfire preparedness in peri-urban areas of Hobart and Sydney, the demographic characteristics of those households that prepare and those that do not, what kinds of preparations are generally made and those preparations that are generally not made. Preparation data from the bushfire surveys will be examined in light of qualitative data from respondent interviews in order to validate the respondents' reporting of their

preparedness levels. A brief description of risk communication practices in each state will be outlined to place householder preparedness in this perspective. This chapter will provide the foundation on which to examine alternative techniques of increasing preparedness that may be used alongside traditional risk communication techniques, many of which are still utilised in bushfire risk communication and in other natural hazard contexts.

3.1.1 Bushfire risk communication in Tasmania

Since November 2006 bushfire risk communication in Tasmania has been undertaken using a DVD-based information kit. The kit *'Prepare to Survive'* was distributed to 38,000 Tasmanian homes that were situated within 100 metres of bushland (taken to include scrub, grassland, farmland, heath, marram grass and button grass). The *'Prepare to Survive'* information kit was distributed with an information booklet and has been accompanied by television advertising that occurred throughout the Tasmanian bushfire season (October to April, 2007 and 2007).

Bushfire risk information on the DVD is presented by a professional fire-fighter, and describes the most important steps that at-risk householders should consider in the lead-up to the bushfire season, and once a bushfire threat has been identified. The DVD identifies and details several pieces of information that the Tasmania Fire Service (TFS) believes are of most importance for people living close to the bush: what it's like to be in a bushfire; why houses burn in bushfires; why people die in bushfires; the importance of preparing a bushfire plan; staying to defend or leaving early; preparing a defendable space; providing access and water for fire-fighters; and, providing a checklist of important steps to be considered in the lead-up to the bushfire season, and if bushfire threatens.

The objective of the DVD is primarily to inform people, increase bushfire salience, and provide information that the fire service believes people can use to increase their self-sufficiency and resilience to bushfire. This risk communication technique is founded on information dissemination, and relies on the receivers of the information recognising the information is important (and meaningful to them) and acting on it in the way the TFS identifies is most appropriate.

3.1.2 Bushfire risk communication in New South Wales

In New South Wales, two agencies are responsible for bushfire management. The Rural Fire Service (RFS) is a rural fire-fighting organisation populated by volunteers and resourced by the state government. Peri-urban and urban locations are under the jurisdiction of the New South Wales Fire Brigades (NSWFB), which is an organisation of professional fire-fighters. All householders from Sydney who took part in this research were from areas under the jurisdiction of the NSWFB, but in bushfire threat situations these localities would also receive fire-fighting support from the RFS.

The NSWFB provides information to householders (included in this study) in the form of fact sheets obtainable from their website. These documents provide information that is generally very similar to that provided by the TFS and described above. Aside from providing information, the NSWFB has also established Community Fire Units (CFUs) in peri-urban neighbourhoods at risk of bushfire. The CFUs are volunteer groups of local residents trained (by professional fire-fighters) to safeguard their homes against bushfire until the arrival of emergency services. The RFS has also taken a community-based approach to bushfire management with their FireWise community initiative, though this is still fundamentally an information dissemination program.

Bushfire risk communication in NSW is fundamentally based on information dissemination, but this traditional approach is complemented by the community-based Community Fire Unit and FireWise programs. The NSWFB identifies the importance of ensuring community involvement in bushfire risk management, specifying that engaging the community "represents a proactive rather than a reactive approach by the NSW Fire Brigades to decrease the impact of bushfires on the community" (NSWFB, 2007).

3.2 Methodology

For a detailed outline of the quantitative and qualitative data collection techniques used in this thesis refer to *chapter 2*.

For the purposes of this chapter, data collected from in-depth interviews in 2006 and 2007 were examined along with data from surveys conducted in 2006 and 2007. All quantitative

data obtained from surveys were analysed using SPSS Version 17. Descriptive analyses for the current purposes were restricted to an examination of survey respondent demographics and reported preparedness actions (2006 Q 31, 2007 Q 27 – see Appendices A and B).

3.3 Results

3.3.1 Basic demographics of survey respondents

Around Hobart the average age of respondents ranged from 50.2 years in 2006, to 52.9 years in 2007. The average time spent in the suburb of residence was approximately 14 years, and most respondents had resided in their present house for 12 years. In 2006 90.7% of respondents owned their homes (8.1% rented), and in 2007 94.2% of respondents owned their homes (5.3% were renters). Respondents most commonly reported an income of $85,000 or above. In 2006 47.2% of respondents were women, and in 2007 the proportion of women respondents was 49.8%. Based on 2006 census data, renters are likely underrepresented among the survey respondents (for example, 23% of the South Hobart population was renting in 2006).

Around Sydney the average age of respondents was 54.1 years. People had lived for an average of 17 years in their suburb, with an average 16 of those being in their current residence. A far greater proportion of respondents owned (95.9%) their homes than rented (3.3%). Most (64.5%) residents reported a household income of greater than $85,000. The proportion of male respondents was 56.2%, with 43.8% female.

These demographics (see Table 3.1 for more detail on these demographics) are consistent with a population that would be expected to be familiar with the level of bushfire risk in their environment that could have an impact on their homes and lives (Paton *et al.*, 2006).

Table 3.1. General demographics of populations surveyed.

	2006 Tasmania	2007 Tasmania	2007 NSW
Age (mean)	50.2 years	52.9 years	54.1 years
Income (modal response)	≥$85,000	≥$85,000	≥$85,000
Time in suburb (mean)	14 years	14.5 years	17 years
Time in current house (mean)	12 years	12.6 years	16 years
Age:			
<25 years (%)	1.7	0.8	0.4
26-43 years (%)	29.7	26.4	23.6
44-64 years (%)	53.3	51.2	49.4
>65 years (%)	12.5	19.1	24
Proportion owning (%)	90.7	94.2	95.9
Proportion renting (%)	8.1	5.3	3.3
Sex:			
Male (%)	52	50.2	56.1
Female (%)	47.2	49.8	43.8

Additional demographic characteristics are detailed in Table 2.1.

Survey respondents were asked to identify whether they "had done", "may do", or "will not do" a range of bushfire preparedness items that are known to increase the ability of homeowners to safely defend their properties if bushfire threatens. The following outline of responses about preparedness will focus on those preparations that respondents designate they have done (adopted), because this information provides the best indication of their bushfire preparedness level. No differences in the mean number of preparations carried out were observed between Hobart and Sydney, or between 2006 and 2007 within Tasmania ($F_{2,997}$=0.663, p>0.05). N=1000 for all of the following analyses.

3.3.1 Who makes bushfire preparations?

Many factors are likely to influence people's bushfire preparedness. Aside from the social, cognitive and behavioural factors that will be discussed in detail in *chapters 4, 5* and *6*, demographic characteristics of the peri-urban population such as income, home ownership, length of residence in a bushfire-prone area, age and gender, and bushfire experience have been proposed to influence preparedness. While these indicators may provide a less accurate indication of the likelihood of adopting bushfire preparations, they are nonetheless important to examine.

3.3.1.1 Income

In 2006 and 2007 survey respondents most commonly reported the household income was $85,000 or above (28% and 47% respectively). In 2006 12% of respondents reported a household income of $25,000 or below, while the proportion of low income families (from Hobart and Sydney) was 7% in 2007. No significant differences in preparation adoption were observed between households in the five income classes (see Appendix B or C) in any location or between years. This finding was supported by the largest proportion of respondents reporting (Q32a, Appendix B) that the cost of preparing was not a factor that prevented their adoption of preparatory behaviours (Hob 2006 – 34%, Hob 2007 – 41%, Syd 2007 – 36.2%).

3.3.1.2 Homeowners and renters

Many more homeowners (as a proportion of people responding to the questionnaire) responded to the bushfire preparedness survey than people renting (see Table 2.1), which reflects the greater capacity of homeowners to make changes to their properties, and therefore their greater interest in bushfire preparedness and the safety of their community (DiPasquale & Glaeser, 1999). By contrast, renters may see themselves as transitory, which affects their risk beliefs and actions, and necessarily have a decreased capacity to make some bushfire-safe changes to the home. However, this capacity deficit did not preclude renters from developing an interest in the importance of preparing for bushfire, and adopting preparations that fell within their capacities. In 2006 Hobart renters had adopted a mean of 20 items from the 54-item bushfire preparedness scale (Hob 2007 - 23, Syd 2007 - 25), while homeowners had adopted a mean of 29 (Hob 2007 - 29, Syd 2007 - 28). Homeowners were significantly more likely to adopt preparedness items than renters ($F_{1,986}$=11.32, p<0.05) and were indeed more likely to make a mix of structural and non-structural preparations around their homes (*e.g.* installing water tanks, purchasing fire pumps, screening floors and eaves *etc).* Renters were more likely to undertake non-structural preparations (*e.g.* clearing the backyard of leaf litter, trimming branches, mowing the lawn or buying a long hose).

Renters in Tasmania had spent significantly less time in their current suburb of residence (2006 – $F_{1,420}$=28.6, p<0.01, MSE=181.0; 2007 – $F_{1,342}$=10.9, p<0.05, MSE=158.1) than homeowners.

3.3.1.3 Length of residence in the peri-urban zone

Respondents were asked to identify how long they had lived at their current home. Sydney residents had lived in their current suburb on average slightly longer (17.6 yrs) than Hobart residents (2006-15 yrs, 2007-14.4 yrs). Time in the current dwelling was classed into four groups: less than one year, one to three years, three to 10 years, and longer than 10 years. Most respondents had lived in their current dwelling for more than 10 years (46%), 28% for between three and 10 years, 20% for one to three years, and only 6% for less than a year. Respondents who had lived in their current homes for more than 10 years were adopting consistently more preparedness behaviours than people with shorter residence times (Figure 3.1), and a distinct significant linear trend ($F_{1,99}$=43.9, p<0.01, MSE=102.3) was shown, where increased preparation adoption corresponded to increasing length of time spent in the current dwelling.

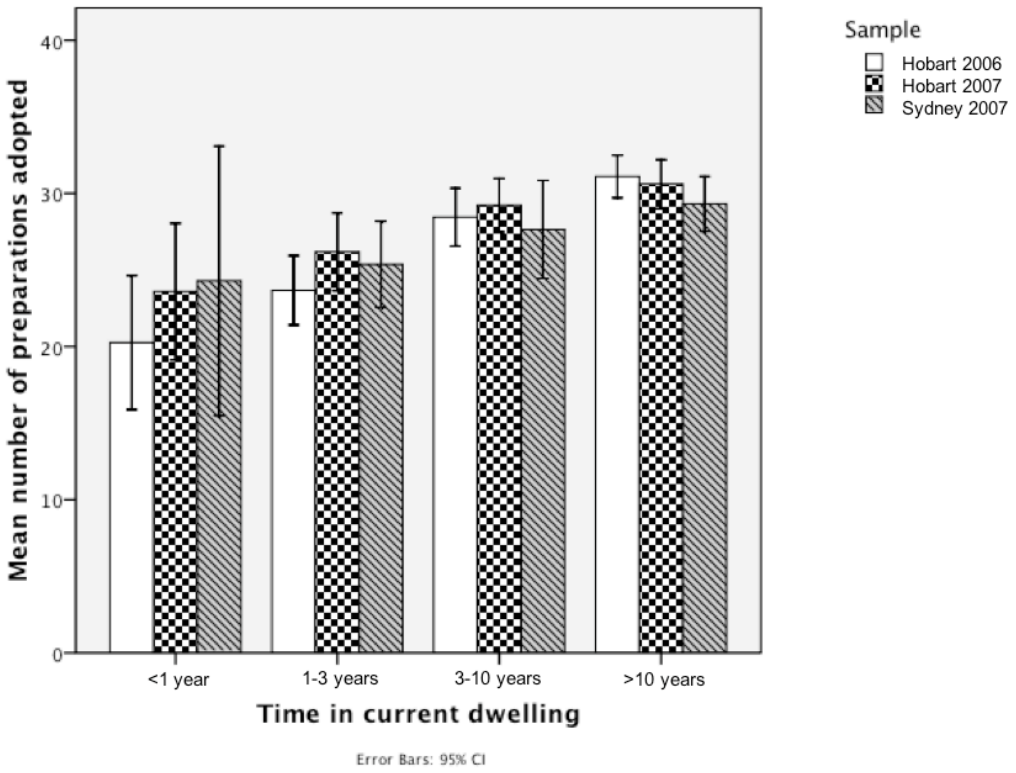

Figure 3.1. Mean number of preparations adopted based on residency length in current dwelling.

Householders who had lived in their current dwelling for three or more years reported adopting significantly more bushfire preparations ($F_{3,988}$=16.36, p<0.01, MSE=102.4) than those householders who had moved to their present house less than three years ago.

There is a general trend for Tasmanian householders to adopt more bushfire preparations in 2007 than in 2006 (this included a mix of the same preparations, not differences between what was actually done), with the exception of householders who have lived in their current dwelling longer than 10 years. A greater propensity to adopt preparatory behaviours in 2007 may be a result of two important factors. Firstly, at the beginning of the 2006 bushfire season (October) a bushfire occurred in the suburb of Mount Nelson that threatened homes in the area. It was well publicised as the first bushfire of a very active bushfire season, which was followed closely by a somewhat more extensive bushfire on Hobart's eastern shore. In December of 2006 an even more extreme (characterised by high winds, low humidity and high temperature) bushfire burnt 28,000 hectares on Tasmania's north east coast, destroying peri-urban dwellings and structures in Scamander, Four Mile Creek, Falmouth and St Mary's. Secondly, the Tasmania Fire Service distributed new bushfire risk communication information in the form of a bushfire preparedness DVD in November 2006 to 38,000 homes in peri-urban and rural areas of Tasmania. Both factors may have influenced the levels of householders' preparedness in Hobart, and this will be discussed further in section 3.4.

No relationship was observed between bushfire preparedness and the suburb in which respondents resided. In the Hobart peri-urban suburbs surveyed in the lead-up to the 2006/07 and 2007/08 bushfire seasons (Mount Nelson, Taroona, Cascades and Howrah), no significant differences in preparation adoption were observed between years.

3.3.1.4 Age and bushfire preparedness

The age of respondents ranged from 18 to 87 years, with an average respondent age of 52 years. Most respondents were aged 44 to 65 years (51.1%), followed by those aged 30 to 44 years (26.2%). Only 4.3% of respondents were aged less than 30 years.

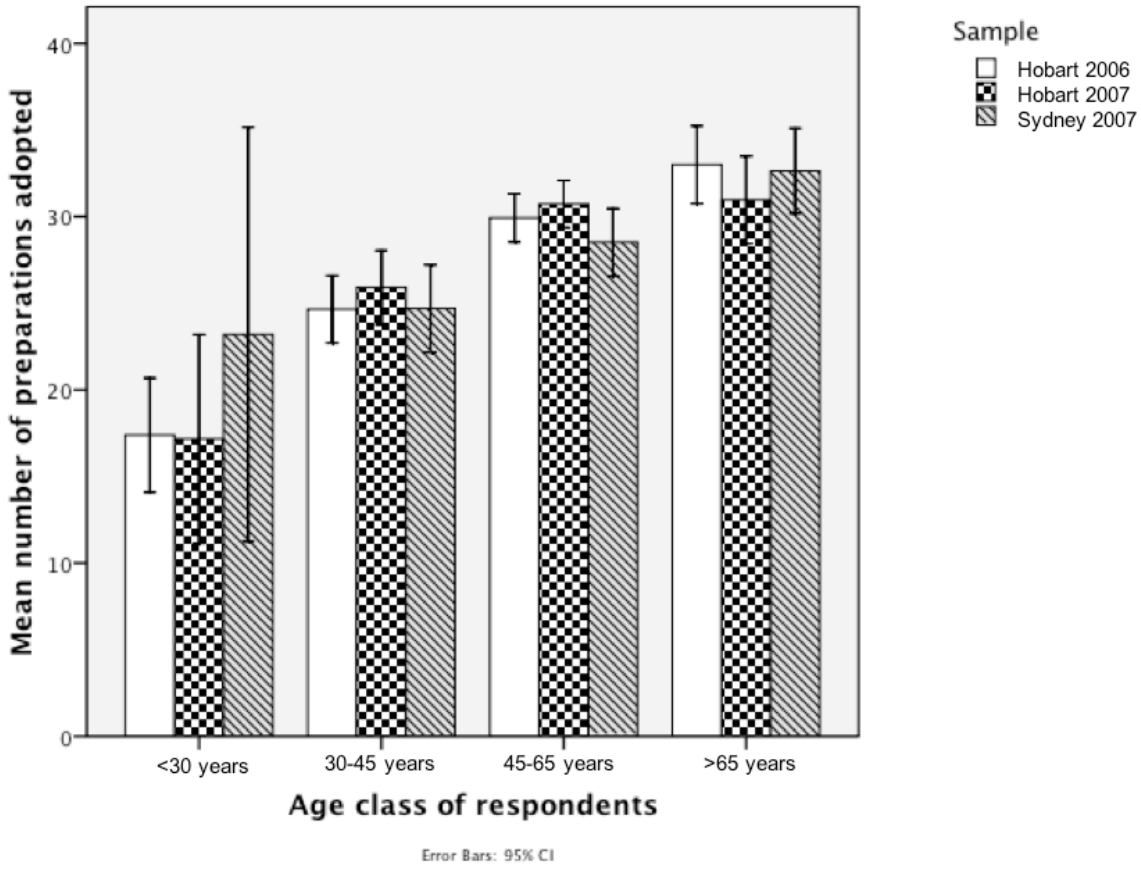

Figure 3.2. Mean number of preparations adopted based on age of respondents.

Householders younger than 30 years of age adopted significantly fewer bushfire preparations than those aged between 30 and 44 years. Likewise, householders older than 44 years of age adopted significantly more bushfire preparations than their younger neighbours ($F_{3,963}$=27.5, p<0.01, MSE=97.1). Analysis of the linear upwards trend in bushfire preparation adoption with age was significant, $F_{1,971}$=84.7, p<0.01, MSE=97.1.

3.3.1.5 Gender and bushfire preparedness

Overall the balance of male and female respondents returning the survey was similar (52% men, 46.8% women). In 2006 and 2007 the respondent male/female gender-based response in Tasmania was consistently even (2006 – 52.1%/47.2%; 2007 – 49.3%/49%), but the difference was more pronounced in Sydney where 56.1% of respondents were male, and 42.5% were female. Of the 54 preparation items listed in the survey, male respondents reported adopting an average of 30, while females reported adopting an average of 26. This

difference in preparation adoption was significant ($F_{1,982}$=33.2, p<0.01, MSE=103.7), and the pattern was consistent between years in Tasmania, and between sampling localities within Tasmania.

3.3.1.6 Bushfire experience and preparation measure adoption

Respondents were not provided with guidelines that defined what constituted bushfire experience. Individuals reported experience based on their own perception of what bushfire experience may be, and these perceptions understandably varied considerably.

The proportion of respondents reporting bushfire experience was consistent between years in Tasmania, and between sampling locations (Table 3.2). In 2006 69.1% of respondents from Hobart reported having had bushfire experience, while 30.5% had not. In 2007 68.8% of Hobart respondents reported having had bushfire experience, 30.7% had not, and 68.8% of Sydney respondents had experienced bushfire, 30.3% had not. People who reported having had bushfire experience adopted on average 30 preparations, significantly more than those respondents who reported having had no experience, and who adopted an average of 24 actions ($F_{1,988}$=70.5, p<0.01, MSE=101.4) from the preparation scale. This influenced overall preparedness, but not the kinds of preparations people undertook.

Table 3.2. Bushfire experience among respondents from Hobart and Sydney (% of respondents).

	Experience		**No experience**	
	Hobart	Sydney	Hobart	Sydney
2006	69.1	N/A	30.5	N/A
2007	68.8	68.8	30.7	30.3

3.3.2 Which bushfire preparations do householders make?

In line with fire agency recommendations, all respondents had undertaken some activities on their property to prepare for the threat of bushfire. These activities ranged from basic preparations like keeping the property clear of litter, ensuring adequate water supplies, and having the necessary implements at hand to effect preparations (hoses, metal buckets, ladders, rakes *etc*), to more significant preparations like having a household bushfire emergency plan, ensuring the property is adequately insured and developing an understanding of bushfire and bushfire attack. The proportions of respondents identifying they

had adopted preparations from the list is provided in Table 3.2, with each item's proportion ranked in descending order (split into Hobart and Sydney respondents in 2007) to show the relative importance of each item within years and between states.

In general, the 10 most commonly reported preparedness items are recurring between Hobart respondents in 2006 and 2007, and between Hobart and Sydney respondents in 2007 (Table 3.2). These preparation items include a mix of basic property related preparations, and more conceptual or bushfire awareness related preparations. Some of these preparedness items are likely to be carried out by all households (regardless of whether or not they are at risk of bushfire) and although they are important for a household's overall bushfire preparedness, taken alone they don't necessarily reflect a high level of, or interest in household bushfire preparedness. Such items include making sure the home is adequately insured (Hob 2006 - 86.3%, Hob 2007 - 86.0%, Syd 2007 - 88.7%), mowing the lawn (Hob 2006 - 83.5%, Hob 2007 - 86.9%, Syd 2007 - 89.1%), having long hoses around the house (Hob 2006 - 83.3%, Hob 2007 - 83.1%, Syd 2007 - 76.0%), and having good access to water supplies (Hob 2006 - 73.7%, Hob 2007 - 76.9%, Syd 2007 - 79.6%). Other preparedness items ranked in the top 10 included being aware of fire danger ratings and total fire bans (Hob 2006 - 92.8%, Hob 2007 - 93.7%, Syd 2007 - 87.3%), and having an awareness of bushfire weather (Hob 2006 - 91.2%, Hob 2007 - 92.3%, Syd 2007 - 82.4%), which were ranked first and second respectively among Hobart respondents in 2006 and 2007, but fourth and sixth respectively by Sydney respondents. The latter group of preparedness items are more likely to be adopted by well-prepared householders living in bushfire risk areas and with an interest in preparing, community defence and defending the home.

The Australasian Fire Authorities Council (AFAC) states that the most important preparation householders can make is the creation and maintenance of a defendable space (AFAC, 2005). Several items in the preparedness scale (Q31, Appendix B) assessed the household's defendable space (item 14) and maintenance of that space (items 4,6,8,16,17,20,21,22,30). Item 14, "I keep the area around my house clear with paving, mowed lawn or low ground cover" was undertaken by 70.9% of Hobart respondents in 2006, and 77.1% in 2007. In Hobart, only the first three maintenance items listed above: "I keep my grass mown short" (Hob 2006 – 83.5%, Hob 2007 – 86.9%), "I keep my property tidy to reduce the threat of

damage by bushfire" (Hob 2006 – 79.1, Hob 2007 – 84.0%), and "I keep my gutters clear of leaf litter" (Hob 2006 – 77.2%, Hob 2007 – 79.4%) rated within the top 10 most adopted preparedness items in that city. By contrast, Sydney residents were more likely to have and maintain a cleared space around their properties. Of the Sydney respondents, 84.2% had a clear space around their house (item 14), 89.1% kept their grass mown short (item 4), 88.7% kept their property tidy to reduce bushfire damage (item 6), 79.2% kept their gutters clear (item 8), 77.8% cleared dry litter from the ground (item 16), and 76% of households cleared undergrowth from fences (proportions of respondents undertaking these preparations, and the relative ranking of this proportion is provided in table 3.2).

Preparedness items that relate to household planning for bushfire were undertaken by consistently low proportions of respondents in Hobart and Sydney (Table 3.2). Generally below 55% of all respondents indicated they had adopted these preparedness behaviours. Items such as having a household bushfire plan (Hob 2006 – 40.5%, Hob 2007 – 43.4%, Syd 2007 – 33.9%), planning the stay or go arrangements for the members of the household (Hob 2006 - 54.4%, Hob 2007 - 56.9%, Syd 2007 - 42.1%), deciding what documents should be taken in a bushfire emergency (Hob 2006 - 47%, Hob 2007 - 42.9%, Syd 2007 - 48.4%), discussing where the family should meet in a bushfire emergency (Hob 2006 - 29.5%, Hob 2007 - 33.1%, Syd - 24.9%), and discussing bushfire planning with family and friends (Hob 2006 - 21.2%, Hob 2007 - 24.9%, Syd 2007 - 17.6%) were all ranked in the bottom third of preparations adopted. Also, the proportion of respondents adopting bushfire planning preparations was generally lower in the Sydney sample than in Hobart.

Overall the preparedness items that respondents are most likely to report they have adopted are those that are relatively easy to accomplish (or at least mark that they have been accomplished) like mowing the lawn or possessing long hoses (see Table 3.3). These are also behaviours that would be undertaken around the home by householders whether they felt they were at risk of bushfire or not. Importantly, none of the top 10 preparedness items include preparations that require the household to make large changes to their properties or their behaviour. An example that outlines this observation is the respondents' reporting of access to water. Hobart and Sydney residents report having good access to water (Hob - 73.7% in 2006 and 76.9% in 2007; Syd – 79.6%), which is presumably a reflection of the

availability of mains water (all surveyed households were on mains water), a supply that cannot generally be guaranteed in the case of a bushfire when fire-fighting services are likely to be tapping into hydrants to fill tankers. For this reason, householders are encouraged to establish alternative sources of water (for example house tanks, dams or swimming pools) that can be used in the case where mains water becomes unavailable. Hobart residents (44.9% in 2006, 44.6% in 2007) were less likely to report having an alternative source of water than Sydney residents (70.1%).

Table 3.3. Proportions (%) of survey respondents who indicated they had adopted preparation behaviours.

Preparedness Item	Hob 2006	Hob 2007	Syd 2007
1. "I try to keep aware of fire danger ratings and total fire bans"	92.8 (1)	93.7 (1)	87.3 (4)
2. "I am aware of the sorts of weather that can produce bad fire days and keep an eye on weather forecasts"	91.2 (2)	92.3 (2)	82.4 (6)
3. "I have checked that I have adequate home and/or contents insurance"	86.3 (3)	86.0 (4)	88.7 (2)
4. "I keep my grass mown short"	83.5 (4)	86.9 (3)	89.1 (1)
5. "I have long hoses that can reach all of my house and garden"	83.3 (5)	83.1 (6)	76.0 (10)
6. "I keep my property tidy to reduce the threat of damage by bushfire"	79.1 (6)	84.0 (5)	88.7 (2)
7. "I have assessed the bushfire risk to my house, such as identifying potential fire risks like timber decking"	77.7 (7)	79.1 (10)	72.9 (14)
8. "I keep my gutters clear of leaf litter"	77.2 (8)	79.4 (9)	79.2 (8)
9. I have considered the risk of a major bushfire when deciding to live in the house that I now live in"	74.2 (9)	74.2 (16)	67.4 (22)
10. "I have good access to water supplies"	73.7 (10)	76.9 (13)	79.6 (7)
11. "I have a basic understanding of how bushfire attacks"	73.0 (11)	82.9 (7)	68.3 (20)
12. "I know what I will do if a fire front is approaching"	73.0 (11)	79.7 (8)	69.7 (18)
13. "I have ladders that are long enough to allow me to check the roof cavity and eaves"	72.3 (13)	76.9 (13)	76.0 (10)
14. "I keep the area around my house clear with paving, mowed lawn or low ground cover"	70.9 (14)	77.1 (11)	84.2 (5)
15. "I keep firewood stacked away from the house"	69.8 (15)	73.1 (17)	67.9 (21)
16. "I clear up dry litter from the ground"	69.3 (16)	77.1 (11)	77.8 (9)
17. "I have removed tree branches that overhang my house"	68.1 (17)	74.6 (15)	70.6 (16)
18. "I understand the impact that a power failure would have on my plans, *e.g.* my automatic garage door would not open"	67.4 (18)	70.0 (19)	59.3 (25)
19. "I have metal rakes and shovels and mops to put out sparks"	66.0 (19)	72.6 (18)	62.9 (23)
20. "I regularly prune and clear dead material from under shrubs and trees"	65.1 (20)	70.0 (19)	75.1 (13)
21. "I keep shrubs and trees from growing against the house"	64.2 (21)	68.9 (21)	72.9 (14)
22. "I have cleared undergrowth from fences"	62.8 (22)	64.3 (22)	76.0 (10)
23. "I have ensured that there are no structures built of combustible materials that are attached to my house"	60.7 (23)	62.0 (23)	62.4 (24)
24. "I have decided who in my household should stay, and who should leave for safety if a bushfire threatens"	54.4 (24)	56.9 (24)	42.1 (30)
25. "I have checked that all roof coverings fit tightly so that there are no openings through which sparks might get blown"	52.6 (25)	51.4 (27)	51.1 (27)
26. "I have planned what I will use to block my gutters"	52.6 (25)	52.3 (26)	35.3 (31)
27. "I have replaced missing or damaged roof tiles"	49.5 (27)	52.9 (25)	69.2 (19)
28. "I have decided what to do with my pets and other animals should a bushfire threaten my property"	48.8 (28)	42.6 (32)	45.2 (29)
29. "I have decided what documents and personal effects I would take with me if I left the house, and have stored them where I can easily reach them in an emergency"	47.0 (29)	42.9 (31)	48.4 (18)
30. "I have removed mulch from close to my house"	45.1 (30)	50.9(28)	51.6 (26)
31. "I am aware of alternative water sources such as ponds and pools"	44.9 (31)	44.6 (29)	70.1 (17)
32. "I have a household bushfire emergency plan"	40.5 (32)	43.4 (30)	33.9 (32)
33. "My plan covers where my family should meet during a bushfire emergency"	29.5 (33)	33.1 (33)	24.9 (34)
34. "I have screened my vents and eaves with metal fly-wire"	21.4 (34)	20.0 (35)	29.4 (33)
35. "I have advised my family and friends of my bushfire emergency plan"	21.2 (35)	24.9 (34)	17.6 (36)
36. "I have metal buckets for fire-fighting"	19.5 (36)	18.9 (36)	12.7 (38)
37. "I have screened the under-floor spaces of my house with metal fly-wire"	18.6 (37)	18.3 (37)	24.4 (35)
38. "I have fitted shutters or metal screens to my windows"	10.7 (38)	6.6 (39)	15.8 (37)
39. "I check the contents/operation of my emergency kit before the fire season, and monthly during the fire season"	9.8 (39)	11.7 (38)	6.8 (39)

NB: Does not include preparedness items that form part of the emergency kit. Rankings (in parentheses) indicate the preparedness items most commonly undertaken by respondents in each year, with the first survey year (2006) as reference point for surveys conducted in 2007. Each preparedness item is numbered for ease of reference in the text.

3.3.2.1 Respondents' perceptions of preparation

Survey respondents were asked to rate their level of preparedness on a five-point scale where 1=not at all prepared, 5=very prepared (Q16a, Appendix B). Respondents did not over-report their own preparedness, and apart from respondents who marked either 1 or 2 on the scale,

significantly more preparations were adopted ($F_{4,992}$=136.36, p<0.01, MSE=70.29) by individuals marking progressively higher levels of preparation (Figure 3.3) on question 16a.

In fact, the respondents' reported perceived level of preparedness was a relatively good predictor of the number of preparedness items they had actually adopted (R^2=0.35).

Respondents were also asked to rate (on the same scale as Q16a) how prepared they thought other householders in their community were (Q16b, Appendix B). Most respondents felt other householders were prepared to a medium extent (50.6%, response 3), and that few other householders were either very prepared (1.1%, response 5) or not at all prepared (4.5%, response 1). However, 28.2% of respondents believed other households were poorly prepared (response 2). Respondents reported their own preparedness levels as significantly higher than other householders in their community (t_{975}=15.78, p<0.01), though respondents who reported they were well-prepared were also more likely to report that other members of their communities were also better prepared.

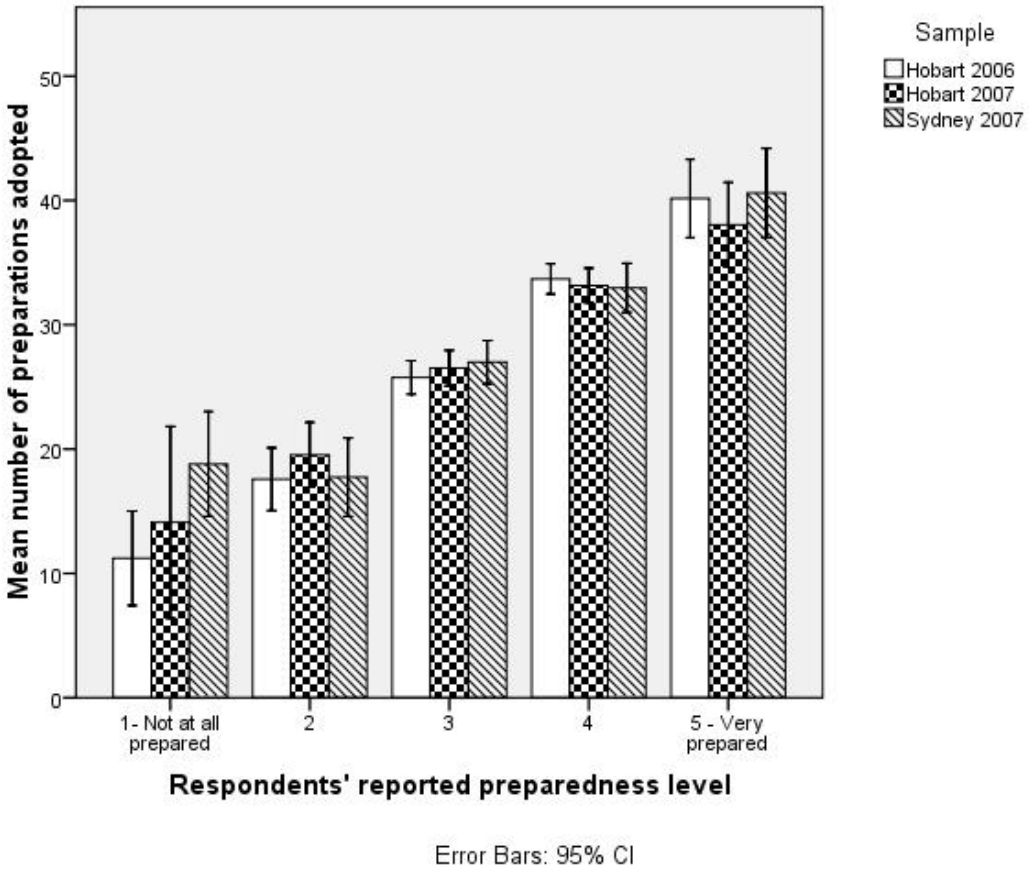

Figure 3.3. Relationship between respondents' actual and perceived levels of preparedness.

3.3.3 Validating respondents' claims of preparation adoption

In order to place the above findings within an appropriate social context, and to validate (through triangulation) the data collected in the bushfire preparedness survey, an assessment of preparedness was conducted on a selection of survey respondents who were interviewed in conjunction with the survey. This comparison excludes those individuals interviewed in the pilot study because their interviews could not be directly connected to a bushfire preparedness survey.

The actual preparations made by the respondents were determined from their interviews, and this information was used to validate the preparations the interviewee had indicated on their survey. Generally, most of the heavily endorsed preparedness items (*e.g.* maintaining an open space around the house, having hoses and clearing gutters) are everyday actions for many householders, reflecting their daily needs, rather than specific actions undertaken to mitigate bushfire risk. Most interviewees discussed having undertaken these behaviours, and

this information was corroborated by the findings discussed above regarding the proportions of respondents undertaking each of the preparedness behaviours.

However, apart from these “everyday” items there was little correlation between the preparations interviewees discussed during the interview, and those preparations they had marked on their surveys. Most of the respondents may have undertaken the preparedness items on the survey at some stage, but many of these items should be undertaken annually, and based on the interviews, most people had not adopted the listed preparations recently. Based on the comparison, interviewees generally over-reported their preparedness levels in the surveys, and this should be taken into account when discussing preparation as measured from the survey. This is consistent with findings from other hazard preparedness research (see for example CDRSS, 2006; Charleson, Cook, & Bowering, 2003; Emdad Haque, 2000; Grothmann & Reusswig, 2006; Jakes, 2002; Paton*, et al.*, 2008c; Thomalla & Schmuck, 2004).

The following provides an outline of preparation beliefs, reported preparation and actual preparations undertaken by individuals whose preparation surveys could be validated against an in-depth qualitative discussion of their actual preparations. As one would expect, different people held different preparation beliefs, which loosely determined their level of preparation. People who were less concerned about the threat of bushfire, and less interested in preparing often reported undertaking a reasonably large number of “soft” preparations (those that could be associated with daily activities around the house, like mowing the lawn), but fewer “hard” preparations (those undertaken beyond daily life, which require specific investment of time or money in order to reduce bushfire risk, like purchasing a fuel pump or building an alternative water supply). The distinction between “soft” and “hard” preparations, and the implications for bushfire preparation and risk communication are discussed in detail in section 3.4. A summary of the number of preparations reported, and the proportion of “soft” preparations relative to the number of preparations reported is provided in Table 3.4. Interviewees’ preparations are discussed in descending order from those who considered bushfire threat a significant part of their lives.

Table 3.4. Proportions (%) of survey respondents who indicated they had adopted preparation behaviours.

Interviewee	Number of Preps Reported	Proportion of "Soft" Preparations
Sofia	45	22%
Claire	44	27%
Layne	29	31%
Joel	41	41%
Mick	36	30%
Jacqui	34	35%
Jessi	20	55%
Megan	32	40%
Michael	32	43%
Cory	36	41%
Dean	19	57%
Taj	22	48%
Kelly	20	65%
Andy	5	40%
Sam	27	66%
Damien	29	68%
Stephanie	19	68%
Rebecca	20	75%
Julia	24	79%

3.3.3.1 'Sofia'

Sofia had relocated to Australia from Europe and had not experienced bushfires until moving to Australia. She is one of the two most prepared interviewees, and her attitude to preparing was positively influenced by the shock of being evacuated (because of bushfire) from her home soon after arriving from Europe – "The fire brigade knocked at our door and said, 'You have to be evacuated', we said, 'What for?' And of course we were sitting in smoke, but we didn't think it was that close, and we had to be evacuated, and it really gave us a hell of a shock". Fearing that this might happen again, and that she "has a good house [she] has to protect", she has become extremely proactive in terms of preparing – including installing expensive sprinkler systems, extra water tanks, and learning about exactly what needs to be done to effectively prepare, and safely defend a house during bushfire. She was quite critical of the apathetic nature of Tasmanians to preparing for bushfire, indicating that "some of [her neighbours] still don't [prepare] because they sit on their bums and think, 'Oh the fire brigade has to rescue me', instead of having the attitude that I first prepare as much as I can so that the fire brigade can save me". "I think it's a whole mentality clash between English thinking

and German thinking – you know Germans are very thorough, and what they do, they do 100%".

Sofia had adopted 45 of 54 preparedness items.

3.3.3.2 'Claire'

Claire was one of the three most prepared individuals, but because of "an innate fear of bushfires, which is psychological, not physical, not preparedness, I'm at a bit of a loss to explain it, but that's that innate fear of fire I've had since I was a kid, and there's no way that I've had the direct experience with a fire that would cause me that kind of worry". As a result she feels that having "one more person there [in the event of a fire] I would have no qualms at all, I would stay and defend and know that my preparations would work. Her extensive preparations include installing a house sprinkler system, installing a 5000 gallon tank, buying a petrol fire pump, covering all the sub-floor vents, and preparing sand-filled socks for the gutters, and these things are "ready to roll from October, right through to the end of April". However, her self-efficacy is so low that without help she believes she would be incapable of defending her house. Because of this, and because of her fear of bushfire, regardless of the extensive preparations she has made to protect her house, she has decided "to move back into town" away from areas of bushfire risk. Her motivation is "largely driven by [her] knowledge of what lies ahead in terms of climate change and the increased likelihood of … bushfire". So even though she is well-prepared, and her preparation is "better than the average", she feels that "it doesn't matter how well-prepared you are", you can never predict what's going to happen during a bushfire.

Claire had adopted 44 of 54 preparedness items.

3.3.3.3 'Layne'

In contrast to 'Sam' (an interviewee who also lives in her community), Layne has made extensive preparations. Since moving to the community "about 9 months ago we've put in two large water tanks, … bought a water pump, … cleared lots of trees that were close to the house, … we're replanting things that are fire retardant, and clear up around the place during summer". While "cost is a factor" limiting her preparation, bushfire threat was seen as

important enough to make the necessary investment - “it was very expensive for us to get the tanks and the pump, and my mum actually gave us money to buy those”. Like Sam she relocated to her present residence from a place closer to the city “where [she] wasn’t so aware of [bushfire] because we were closer to the city [and] felt safer”. She attributes her high level of preparedness solely to the members of her community who have experienced bushfire, and “if it wasn’t for them I don’t think we would have been nearly as proactive”. She has a strong belief that her preparations would be sufficient to enable them to defend the house, but this is also influenced by the design of her house, which is “one of the [identified] safe houses on the street … with a [fire] bunker underneath”. While her concern about bushfire as a threat has obviously increased since moving to this area, “with the fear [she has] also become more knowledgeable” and that now she has “some skills to cope with” the “horrendous” nature of bushfire. Layne was one of the three interviewees who had made extensive preparations around the home (along with Sofia and Claire).

Layne had adopted 29 of 54 preparedness items.

3.3.3.4 ‘Joel’

Joel had recently moved into Tolman’s Hill, a relatively new Hobart peri-urban suburb. His perception of risk was quite high, and influenced strongly by the fact that he had family members in the fire brigade – “my father starts running around the countryside fighting fires, so I know it’s time to start thinking about [preparing]”. He had recognised that his house position placed him at great risk from bushfires, and while only having lived in the house for one year, was already intending to purchase a fire pump and was considering installing a rain-water tank. However, he did assert that bushfire “wouldn’t be the only reason I’d be putting a tank in”. He had a particularly pragmatic attitude to bushfire preparations, seeking out the alternative opportunities posed by making preparations, rather than simply undertaking them for the sake of it. While he had a very positive attitude toward preparing, and recognised its value, he stated he had not actually had time to make any substantial preparations at the time the interview was conducted. When threatened by bushfire in 2006 he “went home as soon as [he] knew it was close… plugged in the hoses that we’ve got, filled

up the bath, it might have been overkill, but I guess I'm a little cautious, being the son of a fireman".

Joel had adopted 41 of 54 preparedness items.

3.3.3.5 'Mick'

Mick has experience of fighting bushfires "having seen them, being involved in burn-offs, seeing things getting away". He also quotes an experience "burning off wheat stubble in a paddock and the wind turned, and [he] had to huddle up inside [a] vehicle while the fire went back through it… [which] was pretty scary". He is aware of fire weather, and has consequently thought about the need to prepare, he'd "thought about it, but in fact, hadn't done anything" about preparing his home. For Mick, the low salience of bushfire is the primary influence on his lack of preparedness. He states that "certainly I spend a lot of time preparing for fire", yet those preparations seem to extend only to laying hoses about the house, filling gutters and clearing rubbish from around the house. His preparedness trigger "is to look out the window and see smoke", but "the reality is we should all have a date scrawled on the calendar to say go and check [your preparedness]".

Mick had adopted 36 of 54 preparedness items.

3.3.3.6 'Jacqui'

Jacqui's preparation is driven primarily by her love for her home. She had moved from the United Kingdom with a strong desire to live in the Australian bush, and "wasn't familiar with bushfires at all". Soon after arriving she "experienced [a] bushfire that came through in '87 or '88" that showed her how quickly fires moves, and "how powerless you can be". It was then that she recognised that her "beautiful celery-top house" was vulnerable, so she has made preparations to reduce the risk that the house might be lost in a bushfire. Her preparations are rudimentary though, and are restricted to having the gutters covered. This action itself was not a response to bushfire safety though, but was made because "the starlings used to nest in the gutters and they made such a noise, but by the way, it does protect your gutters". Her opportunistic approach to preparations also stopped her from buying a petrol fire pump because "you can't use it for your own house water … it's under too much pressure". She

also notes that her preparation is limited by regulation: “the thing I’d like to do more of, which I can’t do, is have small burn[offs] that I can get rid of the debris”, and make the area around her house less vulnerable to bushfire.

Jacqui had adopted 35 of the 54 preparedness items.

3.3.3.7 ‘Jessi’

While Jessi perceives the risk bushfire poses to her house, which she feels is primarily driven by her experience as a fire-fighter, her preparations are strongly limited by her access to fire-fighting equipment, and the cost of making preparations. As such her preparations are limited to “property maintenance basically”. Her preparations are also somewhat limited by the uncertainty of a fire’s severity, and based on this she notes that “the severity of the fire [would determine] whether it was worth staying or going. In not a massive fire I think I’d feel comfortable trying to protect my property”, but this assertion suggests she would also be likely to leave her house at the last minute if the fire looked too severe. While she was aware that this ‘bet-hedging’ is dangerous, she was also “aware that [defending is] a pretty risky thing”.

Jessi had adopted 20 of the 54 preparedness items.

3.3.3.8 ‘Megan’

Megan recognised that where she lived was at “potential risk because we border the bush”, but that she felt there was little she could do about preparation because the property bordering her was privately owned and unmaintained. She had no communication with the owner of this property about reducing the bushfire risk there, and had actually been warned not to access the property. She also notes that it is the local council’s responsibility to ensure individuals in the community maintained their properties in a bushfire-safe manner and that “we’re not allowed to make any decisions about tree removal” and that preparation in this way “is out of your control in some ways”. “I probably should feel that I could approach [the neighbours] more generally [but] I’ve never really stopped to consider it”. She realises that she has a high level of complacency when considering bushfires, and that this could be partly attributed to the fact that she has never experienced a bushfire. Having noted this, Megan points out that she would “try to stay with [her] house as long as [she] could”, suggesting she

doesn't understand the danger of defending a house during a bushfire, and the importance of making extensive preparations in order to support the defence of the house.

Megan had adopted 32 of 54 preparedness items.

3.3.3.9 'Michael'

While Michael recognises his house is at risk from bushfire "because there's a stack of bush right up to the back fence", he does not "think the [fire] danger is high enough … because of the weather patterns and the landscape" to make any extensive preparations. Instead he "just [has] a couple of hoses there handy." He also believes the construction of his house would mean the danger of it being burnt down in the event of a bushfire would be low – "I've got a tile roof, and the house itself is [at] limited danger". Michael marked that he had undertaken most preparedness items on the survey, however, his interview did not substantiate this level of preparation.

Michael had adopted 32 of 54 preparedness items.

3.3.3.10 'Cory'

While both Cory and his wife are keen gardeners, who are "constantly thinning and pruning and making good use of the council green waste collection, which should be done more often", apart from this they make little preparations around their home. "In times of fire we'd remove the door-mat." This is a behaviour alluded to in the *Prepare to Survive* DVD. Aside from this, Cory makes no note of other preparations they make, and points out that "I'm in my 60s [and] I think I would, at first sign [of fire] I'd be gone". He does make note that he feels the local council should take more responsibility for bushfire preparation – "I think we're doing our bit, … [and the council] should come and clean up [leaf litter] and burn off a bit more". He also places a good deal of responsibility on his neighbours, whose property is poorly maintained. So while he has made few preparations, he's quite happy to transfer the responsibility for preparing onto others around him.

Cory had adopted 36 of 54 preparedness items.

3.3.3.11 'Dean'

Dean was quite confused as to what he would do in the event that his house was threatened by fire. In one sentence he indicates that "if there was [a fire] on the mountain, and I was aware of it pretty early, I would fill the gutters and do a bit like that, but I wouldn't stay and defend it, I would just maybe do some preparation and then take off early". He then goes on to say that he "think[s] it would be possible to defend [the house]", but if the two tall trees in his yard caught fire and "started throwing stuff everywhere, I don't think I'd want to stay and try and defend [the house], actually having thought about it, looking at those trees I don't know that we would be able to [defend the house] if they caught fire". This confusion suggests Dean has thought very little about planning in the event of a bushfire.

Dean had adopted 19 of 54 preparedness items.

3.3.3.12 'Taj'

Taj is a renter, and is consequently limited in the extent of preparations he can make around his home. He does maintain the house with bushfire preparedness in mind, "but [he's] not about to buy a pump and fire-fighting gear, because you know I might move anytime, or go somewhere else where I won't need that stuff". "I think if it was my house I'd probably set it up and defend it, I think you could do stuff to that house to make it defendable", this suggests he has faith in preparing, and notes that even as a renter he has been able to take his place from "totally undefendable to a situation where … if it was not the actual fire front coming through you could [defend it successfully]. While he seems to have a positive outcome expectancy, this is dependent on the fire's severity, suggesting that "in a big fire we'd be in trouble", and if "a major fire front was approaching or was likely to come to our house, we'd just evacuate". He does note that he found the message from the *Prepare to Survive* DVD was excellent, "the way [the fire service] were sort of emphasising the responsibility of landowners, [and] calling for people to go home and defend their houses".

Taj had adopted 22 of 54 preparedness items.

3.3.3.13 'Kelly'

Kelly is a renter, and so limited in the extent of preparations he could make around his house. Even so he had undertaken basic preparations, like keeping "things around the home ordered … the garden kept … [and] having stuff in the house in case of power failures or fire protection gear or buckets ready". He has had some experience of bushfire, and this has made "[him] a little more aware of the risks involved".

Kelly had adopted 26 of 54 preparedness items.

3.3.3.14 'Andy'

Andy is renting, and while he recognises the importance of preparing, and has "had some basic [bushfire-fighting] training … so I know a little bit about fire behaviours and how to deal with fires", he makes only minimal preparations – "I haven't kind of ever put [preparations] into practice". Most of his preparations are done for other reasons, "partly to keep snakes out … not just for fires" and "really just, it's good to get rid of some of the crap, not thinking of if from a fire safety point of view really". His preparations are also limited because "why would we do stuff if you're not going to get any return". However, this attitude does not solely relate to him not owning his property, and making changes for bushfire defence as an investment in safety, it is driven by the seasonality of fire coupled with feelings of not being responsible – "…why would we do stuff to the house or garden if you're not going to get any return? You know, I mean you'd get immediate returns if there's a bushfire summer, or you know the garden might look nicer or whatever, but it's partly that I think, I feel it's someone else's responsibility". This suggests that he is likely to start making preparations when he knows a fire is about to threaten the house, but recognises that "the hoses and things here are really hopeless … So you know if it was last-minute stuff, we wouldn't be in a very good situation". Ultimately it's salience of bushfire (as alluded to regarding his perception about the seasonality of bushfire) that drives his lack of preparedness – "I noticed when I was doing the survey that it seemed a bit strange that I kind of had this knowledge, but I didn't act on it … I suppose it's the same for a lot of things, that people don't do anything about lots of stuff until they're forced to or until they become closer to the issue themselves, or they know people who are ... I mean thinking

about what would motivate me [to prepare] is probably … stuff happening to people close to me, and then that would stir me a bit".

Andy had adopted 5 of the 54 preparedness items.

3.3.3.15 'Sam'

Sam is one member of an extremely well-prepared community (a second interviewee, Layne, also lives in this community). This community's collective preparation is largely driven by some members of the community who have lived in the street for a long time, having experienced large bushfires in the past. Sam is a recent arrival (relative to the other members of the community) to the community, who relocated from a low bushfire risk area in Hobart. He realised that moving to his present residence places him and his family at high risk from bushfire, and is keen to ensure his home is defendable if the area is threatened by bushfire. He takes "part [in] a fire group that operates down [the street], so when summer comes up [he] always discusses clearing away rubbish" and other preparations. He has had his preparations (clearing, gutters, gardens, drums of water) inspected by members of the local fire brigade, and he "was more worried about [preparing his home] than the [fire-fighter] was". While he has undertaken a moderate level of preparations, making more extensive preparations is limited primarily by the cost of making them. Possibly as a result he feels that he'd "need the help of the fire brigade [to defend the home] to be honest", suggesting he doesn't have a high level of confidence in the preparations he has made. While Sam has an interest in preparing, and recognises the importance of preparing, he has undertaken far less extensive preparations than Layne, another member of the community where he lives.

Sam had adopted 27 of 54 preparedness items.

3.3.3.16 'Damien'

Damien made relatively minor preparations, primarily because he felt that his house was not at great risk from bushfire. This reflects an inaccurate belief about his exposure to bushfire risk – all houses/localities surveyed were deemed to be in areas of high bushfire risk by the Tasmania Fire Service (TFS), and risk mapping by the TFS was substantiated by subjective assessments of bushfire risk during survey distribution. Those preparations 'Damien' had

reported undertaking included “blocking the gutters … trimming hedges … [and] keeping the hoses at each end of the house”. His neighbours (who he perceived to be at greater risk because of their greater exposure to the bush edge) also made minor preparations, but this reassured him – he would be “concerned if there was neck-high grass over the back fence”. He had experienced the 1967 bushfires, having fought the fire with his father to defend the family home, and this memory always stayed at the “back of his mind”. His sense of community was low, believing “people around [him] tend to do their own thing”. Damien had low perception of bushfire risk (even though he lives close to the bush edge), was relatively apathetic about the need for preparation, but felt some responsibility to the others in the community, stating “I would help them out” in the case of a bushfire.

Damien had adopted 29 of 54 preparedness items.

3.3.3.17 ‘Stephanie’

Stephanie doesn’t feel as though there’s much she can do in terms of preparing her home apart from “keeping the grass low”. This is probably related to her belief that she would need others around the house to defend it from a bushfire – “I don’t think I’d really want to necessarily [defend the house] on my own. If there was more than one person helping me then I would probably stay, but I don’t know whether I’d want to do it on my own”. This feeling is exacerbated by the belief that while her neighbours might want to help, “in a crisis situation [she is] not sure [they could]”, because they would be defending their own properties. She goes on to identify that preparing for bushfires “is really up to the individual” but that preparing would be easier if “there was some sort of local fire brigade [who] were more involved in trying to help people maintain their places”. Under these circumstances she feels the general level of community preparedness would be much higher. She has a slightly fatalistic attitude to bushfire preparation suggesting that “if I felt better educated about why, how I could save my house from a fire, but I guess there’s just some situations where there’s nothing that may help anyway”.

Stephanie had adopted 19 of 54 preparedness items.

3.3.3.18 'Rebecca'

Rebecca is essentially unprepared, but has "plenty of buckets around". Her lack of preparedness stems from two main things. Firstly, she is getting towards 60 years of age and feels that "makes her more of a liability than a helper" when it comes to preparing for bushfire, and that "in [this] case you've got no choice, you've just got to go" rather than staying to defend. Secondly, she places heavy reliance on having "someone with you [when a fire comes]. If they could come around in the event of a major bushfire and say this is very risky, you need to do something about it". She's also relying "heavily on the local fire brigade", suggesting "They've got a lot of expertise, and in recent years there only has to be a whiff of smoke and they're out in force, so I have quite a bit of confidence".

Rebecca had adopted 20 of 54 preparedness items.

3.3.3.19 'Julia'

Julia does not prepare at all, noting that "you don't really prepare until [the fire's] on your doorstep". Having "hoses in the right spot" around the house was her idea of preparing. She had made the decision to leave if threatened by a bushfire, but admitted her household would leave at the last minute if the fire "looked severe". Her lack of interest in preparations is largely driven by salience, and the belief that her house is not at risk of bushfire. She notes on several occasions that "I just think it's something that if it's not at the forefront of your mind, it's the last thing on your mind", and that "we don't think, 'Well when are the bushfires coming?' It's like, 'Oh bushfire's coming, it's just over the hill, get the hoses ready'". She did receive the *Prepare to Survive* DVD, and got "a couple of things out of it", but had "forgotten a lot of the stuff". When asked if she found it a valuable communication tool said "Absolutely, yeah, but as to whether I got something, I know I got something out of it, I think it's something that's in your subconscious if you know what I mean".

Julia had adopted 24 of 54 preparedness items.

3.4 Discussion

To begin, it is important to note that the bushfire preparedness survey utilised in this research was distributed by hand to homes either bordering, or within 50 metres of a bush edge. All

homes were consequently subject to relatively high and broadly similar levels of bushfire risk. As a result all homeowners receiving the survey would be expected to prepare their properties for bushfire and to have comparable levels of risk perception if proximity or objective risk was the main determinant of protective action (which is the assumption of fire agencies that develop risk communication messages). Differences between people's perception of bushfire risk and what they can do about mitigating that risk, highlights the role that other interpretive factors play in people's risk perception and preparedness. The basic demographic characteristics of the communities surveyed (detailed in section 2.1.3.1) confirm the assumption that the respondents are actually capable of preparing.

These results provide a snapshot of peri-urban bushfire preparedness in Hobart and Sydney. All respondents made some preparations around their properties, and variations in levels of preparation can be attributed in some part to the basic character of the communities surveyed. For instance, in localities where bushfire is a key community concern, the level of communication between community members about preparation, and cooperative preparation activities increases the general preparedness level of households. Patterns in the types of people who prepare, and in the preparations that are made, indicate that bushfire preparation is not a given in these at-risk communities (*i.e.* preparation does not map directly onto objective risk indices like proximity), but that bushfire risk managers can certainly identify aspects of the community's character that may have an impact on the likelihood that those community members would make bushfire preparations.

These results (particularly the belief among ill-prepared interviewees that "soft" preparations alone constitute effective preparation, and general over-reporting of preparation levels) also support the contention that current risk communication practices are not generating the levels of bushfire preparedness desired by bushfire risk management agencies, and highlighted by current bushfire risk communication policy (AFAC, 2005). While respondents to the bushfire preparedness survey are reporting they undertake a large number of the preparedness items listed in the survey, these assertions are not corroborated by qualitative data collected from telephone interviews. Examples of over-reporting of preparation behaviours are quite common (Charleson, *et al.*, 2003; Paton, 2007a, 2008a) and demonstrate the inherent social desirability of these behaviours (Lopes, 1992). Over-reporting can also exaggerate the

effectiveness of risk communication or education campaigns as respondents attempt to demonstrate (to peers or agencies) their proficiency in achieving the endorsed activities. Using the interviews to substantiate interviewee's claims about their levels of preparation shows that those preparedness items actually undertaken are mostly easy to carry out, or are carried out as part of the residents' daily activities around their properties. This is problematic for fire management agencies because while the preparedness scale included in the survey provides an extensive list of actions that reduce vulnerability from bushfire, the relative preparatory importance of each item (and particularly those most commonly undertaken) for the householder's overall bushfire preparedness varies considerably.

Of the 1000 respondents whose surveys were included in the analyses detailed in this chapter, all had adopted at least one of the 54 preparedness items listed in the survey. Because each of these survey items aims to measure some aspect of an individual's bushfire preparation, it could then be inferred that everyone surveyed is at least partly prepared for bushfire. That respondents are more likely to have undertaken only basic preparations ("soft" preparations), particularly in the development and maintenance of a defendable space, represents unexceptional bushfire defence related behaviour for the most part. While clearly important for bushfire preparedness, mowing the lawn, clearing gutters, and generally keeping the property tidy are examples of preparations that may be undertaken by all residents, whether or not they live at risk from bushfires. These actions may be carried out for a variety of reasons besides bushfire preparation, and in fact, many survey respondents are likely to have responded positively to these items simply because they were included on the preparedness scale and the respondent had carried them out, not because the respondent had any special awareness of bushfire risk, or knowledge of the associated bushfire preparations (however, this could not be ascertained from the data collected). For example, survey respondents might mow their lawn in the spring because they are more worried about snakes moving through long grass than the threat of bushfire.

For this reason, the preparedness measure also included items that would be carried out only by well-prepared households ("hard" preparations). These included specific bushfire planning items like determining whether the property should be defended, who should stay and who should go in the event of a bushfire threat, and discussing bushfire planning among the

members of the household. Having undertaken these items requires the householder to have considered the threat of bushfire seriously but pragmatically, and would suggest a greater concern for and awareness of bushfire threat and preparedness. Therefore, if “soft” or “hard” preparations are considered in isolation, we may not gain an accurate indication of a householder’s actual bushfire preparedness level. It is important to note that focussing on “hard” preparations is an important means of testing the efficacy of the predictors of bushfire preparedness, because measuring actions that are unrelated to preparedness decision-making would yield spurious results.

Consequently, it is then important to consider effective bushfire preparation as a spectrum of activities consisting of both “soft” and “hard” protective behaviours. As such, well-prepared households might be defined as those that have adopted preparations that include, but also go beyond basic actions like having hoses, metal buckets, rakes, or even adequate home insurance. The definition must also include only those people who recognise how they should utilise these behaviours when dealing with bushfire. If this definition of a “well-prepared” household is used, then the number of households falling into this category is a small fraction of those households considered in these analyses (11 interviewees had adopted less than 50% “soft” preparations, and of these only four demonstrated a good understanding of how these behaviours should be used when threatened). This leads to a particularly important facet of bushfire preparation: readiness. Anecdotal reports from the recent devastating bushfires in Victoria (February, 2009) identify that many residents indicated they were prepared, but that they had no time to activate their bushfire plan. It could be hypothesised (with this remaining tentative until the inquiry into factors contributing to loss and death is completed) that such planning might be characterised by “soft” preparations, supported by limited consideration of how those preparations might be used in the event of a bushfire. It may also indicate that while most people living in high-risk areas know they should have a bushfire plan, they may not know how to develop that plan and ensure it can be practically enacted – *i.e.* their protective behaviour does not extend to the adoption of “hard” preparations, which would necessarily be deliberated on and implemented well before the beginning of the bushfire season.

Patterns of bushfire preparation associated with community and individual characteristics of the survey respondents provide an interesting starting point to examine some of the antecedent factors that increase the likelihood that householders would undertake bushfire preparations. Of those factors examined here, home ownership status, length of residence, age, gender and previous bushfire experience impacted on the respondents' bushfire preparation. The suburb of residence and household income had no influence on preparation, which is contrary to studies of hazard preparedness carried out previously, which suggest in particular that higher income correlates positively with hazard preparation (Grothmann & Reusswig, 2006; Phillips, Metz, & Nieves, 2005). Income may not be playing as important a role in bushfire preparedness for two possible reasons. Firstly, all surveys were distributed in peri-urban areas, relatively close to urban centres. These areas are often relatively sought-after as lifestyle oriented alternatives to suburban living, and consequently property values can be high and attract middle to high-income families. Higher household income generally reflects higher education levels (not assessed in the current survey), and these householders may better recognise bushfire risk and the need to prepare and have the funds available to do so. They may prepare as a matter of course, and do so no matter the cost. Secondly, if most households undertake a majority of "soft" preparations (which reflect the activities of their daily lives), then their overall level of preparedness would be high based on the methodology applied here. However, as observed above, high levels of preparation adoption do not necessarily equate to actual preparedness in either an absolute or relative sense. Accomplishing most of the soft preparations requires little extra household expenditure, and may lead to an over-estimation in actual preparedness levels.

Homeowners are necessarily showing more interest in, and have more capacity to make bushfire preparations around the home than their neighbours who rent (Grothmann & Reusswig, 2006). Based on the qualitative data, most people (homeowners and renters) recognise they are at some threat from bushfire, and make preparations to limit their vulnerability to that threat. However, while renters are likely to be making preparations to protect themselves (and families) only, homeowners are making preparations to protect the lives of the household as well as the investment they have made in purchasing their property. Homeowners are likely to develop stronger relationships with their neighbours (DiPasquale &

Glaeser, 1999; Jakes, 2002; Lichterman, 2000; Low & Altman, 1992; McGee & Russell, 2003; Paton, 2000, 2006b; Paton*, et al.*, 2008a; Paton*, et al.*, 2006a) and share bushfire preparation information more freely with other long-term neighbours they know well, thereby increasing the likelihood that community members in these social networks will prepare. Considering these results, home ownership is also likely to be linked with bushfire experience and length of residence, both of which are associated with greater levels of preparation. Living in and owning property in a bushfire risk area for some time increases the chances of being exposed to bushfire. The combination of exposure to bushfire, information sharing between long-term members of the community, and the added responsibility of protecting a large investment (the family home), provides a valuable antecedent that ensures homeowners exhibit greater levels of bushfire preparedness than neighbours who might be renting. For example, “Jacqui” is the owner of “... a beautiful celery-top house, which [she] love[s]”, and her previous experience of bushfire threat “scared the life out of [her], making her feel vulnerable enough to begin making preparations around the house (*e.g.* installing sealed roof gutters). By contrast, “Andy” is a renter and is unmotivated to make preparations around the home – “it’s a rented house, so you know. I don’t know, I suppose if it was my own place maybe I’d be more motivated to [prepare].” While these direct quotes highlight the varying degrees to which householders are motivated to prepare a defendable home, it also suggests that these people are more concerned about protecting property rather than life. Had the interviewees fully understood the bushfire risk communication messages – asking people to prepare regardless and identifying the well-prepared home as the safest place during a bushfire – then being well-prepared would have been a priority whether the interviewee was renting or owned their property outright.

Results linking bushfire experience with preparedness are confused by the fact that the bushfires in Tasmania in 2006 seemed to have little effect on general preparedness levels of those people surveyed in Hobart. For the most part, this experience would have been vicarious for many householders who took part in the survey, with these results suggesting that type of experience is not formative. Even for householders from Mount Nelson, the suburb primarily affected by the Hobart fires of October 2006, no significant increases in preparedness were observed following the fire. These contrary results suggest that the

measure of bushfire experience used in the survey may be an inadequate one, and that relying on people's subjective assessment of their own experiences is inappropriate. Many authors have examined the impact of previous experience on the adoption of protective behaviours (Breakwell, 2000; Caballero, Carrera, Sanchez, Munoz, & Blanco, 2003; Grothmann & Reusswig, 2006; Jacobson*, et al.*, 2001; Johnston*, et al.*, 1999; Paton*, et al.*, 2001a; Paton*, et al.*, 2000a; Prior & Paton, 2008; Weinstein, 1989). Johnson and colleagues (Johnston*, et al.*, 1999; Paton*, et al.*, 2001a; Paton*, et al.*, 2000a) suggest that experience has little positive impact on actual preparedness, showing that while it may increase perceived risk, perception of risk did not increase preparedness, but may actually reduce it. Grothman and Ruesswig (2006) showed that previous exposure to floods was a good predictor of preparedness. Breakwell (2000) and Prior and Paton (2008) indicate that past experience with risk communication may influence individual protective behaviour (positively or negatively depending on personality, emotion, attitudes and belief about risks *etc*). These examples are characteristic of the variability that past experience incites in people exposed to risk, and attests to an enigmatic nature and activity that is difficult to pin down. Nevertheless, householders interviewed for this study continually mentioned the importance of experience as a driver for their own preparedness, so it undoubtedly plays a role in preparation for bushfire, though this role must vary depending on the circumstance and individuals involved. Based on the data collected here, the exact role previous experience does play in preparation remains vague and undetermined.

Gender of the respondent was linked to bushfire preparedness, with males more likely to have (marked they had) adopted more preparations than females. The majority of items on the bushfire preparedness survey necessarily require little physical exertion, so sex differences in preparation adoption may either be attributed to the fact that within the household bushfire preparations are typically viewed as "the man's work" – activities like mowing the lawn, clearing gutters and trimming trees. However, as noted above, while some preparedness activities may be more commonly undertaken by the male in the house, effective household preparation requires a broad diversity of actions, many of which are not gender specific (for example, the gamut of items concerning household bushfire management planning). Greater bushfire preparation adoption by men might also be explained by males'

greater propensity to over-report their preparation level (Grothmann & Reusswig, 2006). This assumption is supported by the qualitative data, which showed that female respondents' survey data matched more closely with the actual preparations they had made based on the preparedness validation conducted during the interviews.

The use of qualitative data collected from interviews with individuals as a subjective bushfire preparedness validation tool, and evidence of householders' actual preparations was particularly important. Used in association with the survey data, qualitative information about preparedness can build a more accurate picture of the householders' protective behaviours, particularly because such information can identify if respondents are over-reporting their preparedness (as may have been the case with sex differences in preparation). Two of the interviewees, Claire and Sofia, were very well-prepared. This level of preparedness was evident both from their interviews and from their completed surveys, on which both had marked having adopted more than 80% of the preparedness items, including soft and hard preparations. A third interviewee, Layne, was also clearly well-prepared based on information provided during the interview, but had actually under-reported her preparations, indicating she adopted only 54% of the preparedness items. Layne was a new arrival to the suburb (Fern Tree, Hobart), having moved from an area of similar bushfire risk, but where her community was not proactive about bushfire preparation. Fern Tree is one of the more proactive communities in Hobart. While Layne reported a relatively low preparedness level in the survey (which included hard preparations), her intentions to increase her preparation levels were very positive. Other respondents (primarily men, but women also) who were clearly not well-prepared based on information provided during their interviews had adopted similar numbers of preparedness items as Layne, but had not adopted a broad spectrum of both soft and hard preparations. Even so, using the interview data to validate the survey data, and considering the types of preparations respondents had adopted, preparations reported by the respondents generally offered accurate representations of a household's actual level of bushfire preparation.

Exploring the socio-economic factors associated with preparedness may help risk communicators to better target bushfire risk communication in communities that are characterised by factors that reduce their likelihood of preparing. For example less

preparation is undertaken in areas where there are a high proportion of renters, where the householders are younger, and in new peri-urban subdivisions that attract families without experience of bushfire. Socio-economic and demographic characteristics of the community are not directly relevant as factors driving protective behaviour adoption, or behaviour change because these characteristics are not easily altered through the use of risk communication or education activities. However, while not directly useful, socio-economic/demographic factors can nevertheless assist risk communicators to direct the investment of their resources and target their message at areas that are likely to display lower levels of preparedness (King, 2001).

Little difference was observed in levels of preparedness in Hobart households between 2006 and 2007 suggesting that the traditional risk communication (*e.g.* the *Prepare to Survive* DVD) based on checklists and the information provision approach has limited effectiveness. In October and November of 2006 (and continued during the subsequent bushfire seasons of 2007 and 2008) the Tasmania Fire Service disseminated new risk communication products throughout Tasmania. At the same time that this information was distributed, large and destructive bushfires occurred throughout the 2006 bushfire season in Hobart and on the east coast of Tasmania. Neither process seems to have had a large impact on Hobart household bushfire preparedness as measured in the current study. Market research carried out following distribution of this risk communication information (EMRS, 2007, 2008) had measured the success of the risk communication process in terms of uptake of the product by the community, its usefulness as determined by people who had watched it, and its appeal to those who had not. These measures provide an idea of the number of DVDs distributed and subjective measure of utility, but without a direct measure of household preparedness to correlate with these measures of utility, such examinations cannot assess the extent to which information in the DVD is used and applied by the community to increase their bushfire preparedness.

That some relatively unprepared householders have often adopted more than half of the preparedness items listed in the survey suggests these actions may be considered part of the respondent's daily life. For these individuals bushfire preparedness checklists may act to limit their preparation. The checklist is designed to guide individuals through important actions that

should be accomplished in the lead-up to the bushfire season, and when bushfire actually threatens – yet many people seem to see the checklist as an indication of their preparedness level. For people with little knowledge of bushfire, bushfire preparation, or who have low perceptions of bushfire risk, the checklist may act to prevent people from adopting significant and important preparations – the "hard" preparations. If such individuals have undertaken a large proportion of the actions on the checklist, which consist largely of those behaviours that are considered part of their daily life ("soft" preparations – having hoses, ladders, mowing the lawn, clearing leaf litter from gutters *etc*) they may consider themselves to be well-prepared, and overlook the need to undertake further important preparations, which may ensure they had considered the threat of bushfire, and planned what to do in order to meet that threat. For this type of householder the checklist might in fact be quite misleading, and an alternative, more interactive risk communication technique may be more appropriate.

3.5 Conclusion

The socio-economic and demographic characteristics examined in this chapter provide an indication of the antecedents of bushfire preparedness. Factors such as length of residence, age, gender, bushfire experience and home ownership can be positively correlated to higher preparedness levels, but it is unlikely these factors are actually driving decision-making about bushfire preparedness. A number of authors have noted the benefit of moving away from socio-economic models of disaster preparedness, instead advocating the utility of socio-psychological models when predicting adaptation to natural hazard activity (Grothmann & Reusswig, 2006; Mulilis & Lippa, 1990; Paton, 2003, 2006b; Paton & Wright, 2008). While the socio-economic approach can be useful in assessing why individuals and communities fail to prepare for natural hazards and identifying where risk communication efforts might be concentrated, understanding the socio-cognitive drivers of the decision to/not to prepare are considerably more useful if the task at hand is the development of more effective risk communication and education materials and techniques. The following chapter identifies the key socio-psychological factors influencing the bushfire preparedness decision and maps out the causal relationships between these factors.

4. Cues Influencing the Decision to Prepare for Bushfire

4.1 Introduction

In Australia, household bushfire preparedness remains low despite considerable effort directed at community education by emergency management agencies (Cottrell, 2005; McLeod, 2003; Paton, 2006b; Paton*, et al.*, 2008a; Paton*, et al.*, 2006a; Paton & Wright, 2008; Proudley, 2008; Rohrmann, 1999; Tibbits & Whittaker, 2007). This trend is supported by the current research, with fewer householders adopting "hard" preparations (those that require bushfire-specific thinking and action). Results discussed in *chapter 3* suggest that householders living in bushfire risk areas are more likely to undertake preparations that can be easily accomplished and require little effort outside of everyday activity ("soft" preparations). To ensure a well-prepared property, householders must be encouraged to undertake both "hard" and "soft" preparations. In order to ensure this mix, risk communicators must seek alternative mechanisms by which to raise and maintain preparedness levels in at-risk households. The recognition that providing information to people on hazards and how to mitigate their impact does not engender preparedness (Paton, 2003), coupled with the fact that bushfire in Australia is a significant public policy issue (McLeod, 2003), requires a redirection of the risk communicator's *modus operandi*.

Assuming people use information in risk communication messages to manage their risk from hazard is hopeful but unfounded (Paton*, et al.*, 2000a). Further research in this vein suggests that people subject to risk from natural hazards interpret their risk in relation to the hazardous nature of the environment in which they live (Paton, *et al.*, 2005), particularly the relative importance of the hazard and whether they perceive something can be done to mitigate its effects. Importantly, Paton *et al.* (2005) demonstrated that these interpretive processes could promote both preparedness motivation and a decision *not* to prepare, an observation supported by similar and more recent examinations of bushfire preparedness (Paton*, et al.*, 2008a; Paton*, et al.*, 2006a). Here, assessments of the socio-cognitive foundations for these decisions can be identified and allow risk communicators to better target information or education in order to gain the outcomes they seek. These observations, particularly by Paton

et al. (2006a), which show how people in similarly risky circumstances can make decisions that are completely different, demonstrate how the outcome of the decision-making process is a fundamentally idiosyncratic one influenced by how people interpret the information available and render it meaningful given their particular circumstances (Finucane, *et al.*, 2000; Sjöberg, 2007; Ward, 1954).

Decision-making research provides added evidence of the difficulties traditional risk communicators will face if they assume that all people receiving the information provided will act in the same (rational) way. In fact people acting under risk do so in a rational way – if observed from the point of view of the actor. This is because rational decision-making is influenced strongly by experience, emotion and affect (Slovic, *et al.*, 2004; Tversky & Kahneman, 1974), which complicate processing of information in an analytical way, resulting in decision-making that is uniquely individual and not necessarily in line with the anticipated outcomes of risk communicators, for example (Breakwell, 2000; Keller, *et al.*, 2006), whose perceptions of what should and should not be done may be radically different from the perceptions of the information receivers.

If information *per se* does not encourage preparation, and if socio-demographic characteristics of at-risk communities provide an indication only of the antecedents of behaviour (Paton, 2003), then what is driving preparedness activity, and is it possible to identify how disaster management and mitigation can be improved? To answer these questions it is necessary to examine how individuals make decisions about natural hazards in the context of their daily lives, and particularly to understand what attitudes, beliefs, experiences or emotions drive the decision-making process. Accomplishing this has required research to move beyond examining the socio-economic characteristics of at-risk communities, to deeper analyses of the socio-psychological processes that underpin decision-making and subsequent behaviour change.

The adoption of socio-psychological approaches to framing risk communication for natural hazards in order to generate sustained behaviour change and preparedness has drawn on research from the field of health protective behaviour (Abraham*, et al.*, 1998; Bennett, 1996; Bennett & Murphy, 1997; Eiser, 1998). This work has highlighted the benefits arising from using socio-cognitive models of behaviour change, rather than relying on just making

information available to people. An extension of this research direction into the field of natural hazards preparation has demonstrated the utility of applying this general approach to identifying predictors of the adoption of protective behaviours and resources for natural hazards (Bishop*, et al.*, 2000; Duval & Mulilis, 1999; Lindell & Whitney, 2000; Paton*, et al.*, 2008a; Paton*, et al.*, 2008b; Paton*, et al.*, 2001a; Paton*, et al.*, 2006a; Paton*, et al.*, 2001b; Paton*, et al.*, 2000a). The latter authors have also identified ways in which existing theoretical models (*e.g.*, theory of planned behaviour) can be developed to accommodate the challenges associated with infrequent, complex hazard events. This work has identified how, for example, problem focussed coping (Duval & Mulilis, 1999; Mulilis & Duval, 1995), self-efficacy and sense of community (Bishop*, et al.*, 2000; Paton*, et al.*, 2008a; Paton*, et al.*, 2001a; Paton*, et al.*, 2001b), preparation intention (McIvor & Paton, 2007; Paton*, et al.*, 2006a; Paton*, et al.*, 2005), outcome expectancy, collaborative problem solving and preparation inhibition (Paton*, et al.*, 2008a) can influence preparedness and resilience to a variety of natural hazards including bushfire.

So, what does influence people's preparation behaviour when facing threat from natural hazards? How do people interpret these influential factors and act on them? In developing an understanding of the individual drivers of bushfire preparedness it is necessary to explore these questions. This chapter will draw on qualitative and quantitative data collected in 2006 and 2007 to develop a broad picture of the primary socio-cognitive drivers of preparedness for bushfires. A simultaneous examination of data collected using both methodological paradigms will outline a comprehensive and complementary list of subjective and objective factors that influence preparedness decision-making. The factors derived during these analyses will be described in the context of the data from which they were obtained, and comparisons between qualitative and quantitative findings will be used to develop a suite of variables that will be considered in the development of a substantive theory regarding bushfire preparedness decision-making.

4.2 Methodology

For a detailed outline of the qualitative and quantitative data collection techniques used in this thesis refer to *Chapter 2*.

For the purposes of this chapter, data from in-depth interviews conducted in 2006 and 2007 were examined along with data collected from householder surveys in 2006 and 2007. All qualitative data obtained from surveys were analysed using NVivo Version 7.0. Survey data were analysed using SPSS Version 16.0 for Mac.

It is important to note that while the qualitative data were the key resource used to explore and describe the bushfire preparedness decision-making process, quantitative data were used secondarily here as a means to help triangulate the important predictors of preparation and to contribute to the development of a robust picture of the importance of each factor in the decision-making process.

4.2.1 Qualitative data analysis

Analysis was conducted initially on qualitative data to derive an indication of how people living in bushfire risk areas are making decisions about their bushfire preparedness. Qualitative data were examined in the first instance because it provides in-depth and directly relevant information from the householder. While it is subjective in nature (not directly verifiable), qualitative data nevertheless gives the researcher valuable information that can be explored, questioned, pulled apart and re-examined in detail with the information source (in this case the interviewee). In-depth interviews consequently provide a mechanism to understand the roles of deeper issues householders face when threatened by natural hazards, issues that are recognised as important in the risk literature, but rarely examined in practice (Baxter & Eyles, 1999; Flick, *et al.*, 2004).

Consequently, exploring the qualitative data first allows an exploration of the *why* and *how* of preparedness decision-making, which can then be used to more fully understand the objective (How much? Where? What? When?) aspects of preparedness decision-making, and to place these findings into a logical context. In this chapter, data from householder interviews is used to describe why and how decisions to prepare or not prepare were made, and therefore identify important individual and community characteristics that can influence preparedness decision-making. As such, this chapter provides the foundation for the development of a theory of bushfire preparedness decision-making that is grounded in

empirical data (Strauss & Corbin, 1990, 1998) collected from those individuals actually making decisions about bushfire preparation.

Following transcription all interviews were reviewed at least twice before coding of decision cues began. Once familiar with the interview, coding commenced, initially identifying key factors from the literature known to influence preparedness, but also developing new codes in an iterative fashion that described key ideas the interviewee focussed on or returned to that had implications for their bushfire preparation. Following first coding, all interviews were reviewed and coding was altered if necessary. After all interviews were analysed once, and all codes in all interviews were known, the coding for each interview was re-checked for consistency between those interviews coded early, and those coded towards the end of the analyses.

Once coding was complete, the inter-relationships between codes were examined with particular emphasis on how each code related to preparedness. Mapping the relationships between codes provided a means of understanding common linkages and directions of influence between important decision cues (coded themes in the interview data). Mapping also identified those cues that influenced several others, or were influenced by several, and key pathways in a decision process leading to preparedness (or the choice not to prepare) through multiple cues. The relative importance of decision cues could also be determined by the frequency they arose among interviewees, and the length of time an interviewee chose to spend discussing these themes during the interview (Strauss & Corbin, 1998).

Ten important themes (Table 4.5) were identified from the interviews conducted: OUTCOME EXPECTANCY, SENSE OF COMMUNITY, PREPARATION INHIBITION, SELF-EFFICACY, INTENTION TO PREPARE, PERCEIVED SEVERITY OF BUSHFIRE, BUSHFIRE SALIENCE, ENVIRONMENT AND BUSHFIRE WEATHER, FEAR OF BUSHFIRE, AGENCY TRUST and RESPONSIBILITY. The operation of each of these themes is discussed in the context of facilitating bushfire preparedness. Given the complexity of the decision-making process, many of these themes operate concomitantly to affect the preparedness decision, and these interactions are also discussed. The themes are described in a loose order of decreasing importance based on the qualitative analyses.

4.2.2 Quantitative data collection and analysis

During the first wave of sampling (2006) a total of 1500 surveys were distributed to homes on the peri-urban fringe of Hobart. During the second wave of sampling 1297 surveys were distributed to homes on the peri-urban fringe of Hobart, and 1500 surveys were distributed to homes on the peri-urban fringe of Sydney. A total of 4297 surveys were distributed during the course of this research. Surveys were distributed systematically to all homes within 50 metres of a bush-edge in the sampling locations identified by the respective Tasmanian and New South Wales fire brigades.

4.2.2.1 Identification of distribution localities

Locations for the distribution of surveys were determined in consultation with fire authorities in Tasmania (Tasmania Fire Service - TFS) and New South Wales (New South Wales Fire Brigades - NSWFB). In discussions with these organisations several important guidelines were addressed when selecting survey locations:

a. Survey locations exhibited similar levels of bushfire risk: Sampling in areas with broadly similar levels of bushfire risk (siting locations with exactly the same levels of bushfire risk is next to impossible in Tasmania and New South Wales) ensures comparability in terms of people's decisions regarding how they manage their bushfire risk. To prevent respondents from developing risk perceptions based on their geographical locations it is important that physical risk is relatively evenly distributed over the survey area. This ensures that people's responses to the risk of bushfire, regardless of whether they prepare or not, will reflect how they reason about their relationship with the hazardous aspect of their environment, not the geographical features of their physical location.

b. Sample areas exhibited different bushfire histories: While it is believed previous bushfire experience plays a role in influencing decision-making about bushfire preparedness, this link is not well understood. In order to examine the way experience influences bushfire preparedness it is necessary to sample areas where residents have and have not experienced bushfire.

c. The community background was readily available: It is important to have a good understanding of the community's attributes including their level of institutional interaction, strength of community cohesiveness and access to bushfire information materials. This information was garnered from meetings with representatives from the Community Fire Branch of the TFS and the Community Safety Division of the NSWFB.

The TFS and NSWFB had mapped bushfire risk in Hobart and Sydney respectively using Geographic Information Systems (GIS) software. While not provided to the researchers, these resources were the primary tool used to collaboratively site sampling locations.

During the 2006 sampling wave, surveys were distributed only around Hobart. Surveys were distributed to a total of 12 suburbs (Appendix D.) that bordered the peri-urban fringe of the city. During the second wave of sampling surveys were distributed in Hobart and Sydney. Surveys were distributed in 21 suburbs around Hobart and 28 suburbs around Sydney during this sampling wave.

4.2.2.2 Mode of distribution

Surveys were distributed throughout those communities/areas identified by the Tasmania Fire Service and (in 2007) the New South Wales Fire Brigades that exhibited broadly similar bushfire risk. All surveys were distributed to mailboxes by hand. In Hobart (both sample waves) the surveys were distributed by T. Prior. Surveys were distributed in Sydney by members of community fire guards of each suburb sampled. Each distributor was given detailed directions on where to distribute the survey in their suburb by the Community Safety Division of the NSWFB (T. Kirkpatrick). Hand distribution enabled the researchers to ensure surveys went to homes within 50 metres of the peri-urban fringe, which could not be guaranteed if the surveys were mailed out. Hand distribution also provided an opportunity to make on-site assessments of the level of bushfire risk to participants in the areas where the surveys were distributed.

4.3.2.3 Timing of survey distribution

Survey data were collected during the early part of the bushfire seasons of 2006 (first wave of sampling) and 2007 (second wave of sampling). In both seasons the surveys were carried out

in the second week of October. October is considered the very beginning of the bushfire season in Australia, but rarely do bushfires occur at this time (Nicholls & Lucas, 2007). This is a time when people are not generally threatened by bushfire, but when they should be contemplating preparations for the upcoming summer. The survey distribution aimed to coincide with this heightening awareness of the coming bushfire season, and as such tap into householders' basic beliefs and attitudes concerning bushfire preparedness, thereby enabling an exploration of the means by which individuals, households and/or communities were responding to bushfire risk.

The 2006 bushfire season began uncharacteristically early in Tasmania, following a particularly dry winter. Extremely warm, dry weather in early October caused high bushfire risk conditions, and a bushfire began on land bordering the suburb of Mount Nelson in Hobart. While the bushfire was small and quickly contained, it threatened homes in the survey area, and received considerable local media coverage. The possible impacts of this bushfire on the preparedness attitudes of survey respondents is discussed in the Results section.

The Tasmania Fire Service (TFS) also began a new community bushfire awareness campaign in October 2006. The *Prepare to Survive* DVD was distributed to 38,000 homes in Tasmania that were within 100 metres of a bush edge (this included peri-urban, suburban and rural properties). While the distribution of this DVD came soon after the distribution of surveys for the present study, many homeowners would have received and (presumably) watched this DVD before returning the survey. The respondents may have consequently reported higher bushfire awareness, intention to prepare, and indeed levels of preparedness than could normally be expected. The effect of the TFS's bushfire awareness campaign is discussed in the Results section.

4.2.4 Data cleaning, management and measure validation

All survey data were systematically entered into SPSS Version 14.0 on receipt of completed surveys. The sufficiently large numbers of surveys returned permitted the removal of cases (surveys) from the data set where the respondent had left large numbers of items blank. Cases in which respondents had skipped or not completed questions relating to variables known to influence preparedness, were also removed from the data set.

All item score frequencies were checked twice in order to identify any data entry errors. Following completion of frequency checks, between five and 10 per cent of cases (in both sample waves) were checked at random to identify any consistent errors in data entry. Triangulating errors in data entry using these two methods identified most data entry errors.

4.2.4.1 Missing Value Analysis

Missing value analysis was conducted on both 2006 and 2007 datasets remaining after data cleaning was completed. In both data sets missing data occurred primarily in items measuring householder preparedness. Overall the 2006 data set had 3.8% missing values. In 2007 there were 1.9% missing values. In 2006 10 items had more than 5% missing values, while in 2007 19 items had more than 5% missing values.

In the 2006 data set systematic missing data was observed in four items. These items were all from the bushfire preparedness measure, and examined aspects of preparedness that were not applicable to all respondents. These items included preparedness related to pets ('I have decided what to do with my pets and other animals should a bushfire threaten my property'), the placement of firewood piles ('I keep firewood stacked away from the house'), maintenance of tile roofs ('I have replaced missing or damaged roof tiles'), and the screening of underfloor spaces ('I have screened the underfloor spaces of my house with metal flywire'). This pattern was mirrored in 2007. The fact that these particular items exhibit a consistent pattern reflects logical responses by the survey respondents; where they cannot answer (for example, they have no pets to worry about when preparing for a bushfire) the item is left blank.

The above missing value statistics are those determined after cases with large amounts of missing data, or data missing from important measures, had been removed from the data sets. The remaining missing data was replaced by a regression estimate calculated in SPSS 16.0 for Mac (available item scores in a measure are used as independent variables to predict the value of the missing data). In order to ensure the accuracy of this missing value replacement technique, regression estimates were compared to hand calculations of the mean of the available item scores within a measure (a more accurate, but overly time-consuming missing data replacement technique). Regression estimates were found to be

consistently close to, or the same as, the mean of the remaining item scores, and was therefore considered a valid replacement technique, and used throughout.

4.2.4.2 Factor analysis of survey measures

Maximum likelihood factor analysis was used to examine the underlying structure of the measures used in the survey, and to confirm that items in one measure fell together as one factor. All measures detailed in section 2.3.1 were tested. The suitability of the data for factor analysis was determined before examining analysis results.

Measures that exhibited more than one factor (using obliminal rotation with Kaiser normalisation) were excluded from further analyses unless those factors could be explained as theoretically plausible with interpretable meanings. Table 4.1 provides a summary of measures exhibiting one factor, more than one factor (and retained), and more than one factor (and excluded). Those measures exhibiting more than one factor and with theoretically plausible meanings are discussed below.

Table 4.1. Confirmatory factor analysis testing of survey measures.

Single factor variables	Variables with >1 and included	Variables with >1 and excluded
Critical Awareness	Outcome Expectancy (positive & negative)	Social Norms
Risk Perception (individual and community)	Sense of Community (Sense of community place & Sense of community people)	Australian Fire Knowledge
Self-efficacy	Collective Efficacy (Cooperative coll. efficacy & Coll. Problem solving)	Volunteerism
Action Coping	Actual Preparations (planning preparations, property preparations & emergency kit)	Burning Off
Preparation Inhibitors	Responsibility (individual responsibility & agency responsibility)	Bushfire Experience
General Trust	Intention (intention to prepare & intention to seek information)	Bushfire Frequency
Resources		
Community Participation		

NB: variables including 'perceived preparation', 'lifestyle', 'visitation to the bush', 'consistency of risk information' and 'bushfire media reporting' are not included in this list as they were either single item variables or otherwise determined to be unsuitable for factor analysis.

OUTCOME EXPECTANCY – The outcome expectancy measure reduced to two factors: positive and negative outcome expectancy. All the items (1,2,7 and 8) that explored negative aspects of outcome expectancy loaded onto the first factor, while items exploring positive aspects of outcome expectancy (3,4,5 and 6) loaded on the second factor. A reduction of the measure in this way is supported by Paton, Bürgelt & Prior (2008a), and enables a more realistic

examination of the way individuals rationalise their beliefs about the effectiveness of bushfire preparations.

SENSE OF COMMUNITY – The sense of community measure reduced to two factors: sense of community – people, which reflected aspects of the measure concerning social cohesion and belonging (four items, 1,2,4 and 5 of Q19, Appendix B), and sense of community – place, which reflected respondents' desires to remain living in the community (two items), or their attachment to place. Adequate preparation for bushfire threat requires a mix of individual/household and community action, and the existence of a social cohesion related factor reflects the need for this duality in preparation, and describes people's feelings of closeness to the community and community spirit. The existence of the second factor, sense of community – place, suggests people have an attachment to place, and Low & Altman (1992) argue that strong attachment to place increases people's emotional investment in their community, and the likelihood they would provide assistance to others in the community in times of bushfire threat. So, while the analysis yielded two clearly different factors, sense of community – place has a strong influence on sense of community – people.

COLLECTIVE EFFICACY – The collective efficacy measure reduced to two factors: collective efficacy and collective problem solving. Collective efficacy describes the way the community (as identified by the respondent) works together in order to gain beneficial outcomes for the community as a whole, particularly when dealing with external agencies. Collective problem solving describes the ability of the community members to work together and solve problems that collectively affect them.

PREPARATIONS – The preparedness scale reduced into three factors (Table 4.2): the first included items relating to the planning householders must consider when preparing for bushfires, the second included items relating to property preparedness, and the third included items concerning the emergency kit householders should prepare against the possibility of bushfire threat. Items falling in the planning factor included things like planning what to do in the event of a bushfire, developing an understanding of bushfire and how to prepare, and planning for power failure. Eighteen items fell into the planning factor. The property-related preparedness factor included items related to those actions people must take around the home in order to make their homes prepared for bushfire. Seventeen items fell into the

property preparation factor. These items included having long hoses, clearing overgrown vegetation, mowing lawns, and having good access to water supplies. The emergency kit factor covered only those items that formed part of the emergency kit – having a battery-powered torch and radio, emergency contact details, fire extinguisher, blankets and protective clothing, all kept together in a bag that can be accessed very quickly if the need arises. All 16 emergency kit items fell into this factor.

Table 4.2. Items from the preparedness scale used in the quantitative survey fell into three distinct factors, as shown here. The scale can be viewed as administered in Appendices A and B. Results of the factor analysis can be viewed in Appendix E. Item numbering is consistent between Table 4.2 and Appendix E.

Preparedness Planning	Property Preparedness	Emergency kit with:
1. I have considered the risk of a major bushfire when deciding to live in the house that I now live in.	2. I keep my property tidy to reduce the threat of damage by bushfire	17.Torches
7. I have a basic understanding of how a bushfire attacks	3. I keep my gutters free of leaf litter	18. Spare batteries for torch
8. I have assessed the bushfire risk to my house, such as identifying potential fire risks like timber decking	4. I keep shrubs and trees from growing against the house	19. Candles
9. I have a household bushfire emergency plan	5. I keep firewood stacked away from the house	20. Matches/lighter
10. I have advised my family and friends of my bushfire emergency plan	6. I clear up dry litter from the ground	21. AM/FM battery powered radio
11. I have decided who in my household should stay, and who should leave for safety if a bushfire threatens	16. I have checked that I have adequate home and/or contents insurance	22. Spare batteries for radio
12. My plan covers where my family should meet during a bushfire emergency	33. I have long hoses that can reach all of my house and garden	23. First aid kit
13. I have decided what documents and personal effects I would take with me if I left the house, and have stored them where I can easily reach them in an emergency	37. I have good access to water supplies	24. Essential medication
14. I have decided what to do with my pets and other animals should a bushfire threaten my property	39. I keep my grass mown short	25. Fire extinguisher
15. I understand the impact that a power failure would have on my plans, *e.g.* my automatic garage door will not open	40. I have cleared undergrowth from fences	26. Fire blankets
34. I have metal buckets for fire-fighting	41. I have checked that all roof coverings fit tightly so that there are no openings through which sparks might get blown	27. Protective clothing (shoes, natural fibre clothes *etc*)
35. I have ladders that are long enough to allow me to check the roof cavity and eaves	42. I have replaced missing or damaged roof tiles	28. Bottled drinking water
36. I have metal rakes and shovels and mops to put out sparks	43. I have ensured that there are no structures built of combustible materials that are attached to my house	29. Long-life energy food
38. I am aware of alternative water sources such as ponds and pools	44. I have screened my vents and eaves with metal fly wire	30. Emergency contact details
45. I have planned what I will use to block my gutters	46. I regularly prune and clear dead material from under shrubs and trees	31. List and location of valuables
52. I am aware of the sorts of weather that can produce bad fire days and keep an eye on weather forecasts	47. I have removed tree branches that overhang my house	32. I check the contents/operation of my emergency kit before the fire season, and monthly during the fire season
53. I try to keep aware of fire danger ratings and total fire bans	48. I have screened the under-floor spaces of my house with metal fly wire	
54. I know what I will do if a fire front is approaching	49. I have fitted shutters or metal screens to my windows	
	50. I have removed mulch from close to my house	
	51. I keep the area around my house clear with paving, mowed lawn or low ground cover	

This preparedness scale is based on that developed by Mulilis, Duval & Lippa (1990), and has (apart from some bushfire-specific items added to the measure by Paton *et al.*, 2006) been utilised in studies of preparation in relation to tsunami threat (Paton*, et al.*, 2008b), volcanic hazards (Ballantyne*, et al.*, 2000; Paton*, et al.*, 2000a), and earthquake (Ballantyne, *et al.*, 2000). These studies have examined preparedness using the entire scale, and advice from these authors was sought regarding whether the scale should be separated in the way that the factor analysis suggested. Because of the nature of the items, and their importance in the scale, it was advised that the scale should be examined as a whole in all further analyses.

RESPONSIBILITY – The responsibility measure reduced to two factors, the first relating to personal responsibility, and the second relating to the respondents' perceptions about the responsibility of fire agencies in the event of a bushfire. The personal responsibility factor reflected a respondent's ideas about how they were personally responsible (or not) for mitigating the effects of bushfire. Many respondents felt that it was the responsibility of fire management agencies to help them to prepare for bushfire, and the second factor reflected the different attitudes held by the respondents who scored highly on the two items that loaded onto this factor.

INTENTION – This measure examined people's intentions about preparation, and reduced to two factors that reflect results obtained by Paton *et al.* (2006a). The first factor reflected people's intentions about the preparations they intended to carry out in the coming bushfire season (items 1 and 2 of Q15, Appendix B), while the second factor reflected people's intentions to seek information about preparing. Paton *et al.* (2006) showed that each of these intentions could predict the likelihood that individuals would carry out preparations – with people intending to prepare more likely to undertake preparations than those who intended to seek information about preparing.

4.2.4.3 Internal consistency of questions

Following factor analysis the internal consistency (reliability) of all questions (including those reduced in the factor analysis) were examined using the Chronbach's α (alpha) statistic. The alpha score generally increases as the correlations between items increase, and higher alpha scores for a set of items suggest those items measure similar characteristics and are

considered to exhibit good internal consistency. For the purposes of this research, only measures where the alpha score was close to 0.7 or greater were included in further analysis, because high reliability indicates the measure is replicable. A list of all measures, their Chronbach's α statistic, and whether they were included in further analysis is provided in Table 4.3.

Table 4.3. Internal consistency of measures used.

Measures	Chronbach's α	Included
Critical Awareness	0.876	Yes
Risk Perception	0.879	Yes
Outcome Expectancy		
• Positive	0.799	Yes
• Negative	0.653	Yes
Responsibility		
• Individual responsibility	0.720	Yes
• Agency responsibility	0.351	No
Self-efficacy	0.748	Yes
Action Coping	0.882	Yes
Intention		
• Intention to prepare	0.776	Yes
• Intention to seek information	0.794	Yes
Sense of Community		
• Sense of community *place*	0.726	Yes
• Sense of community *people*	0.746	Yes
Community Participation	0.522	No
Collective Efficacy		
• Cooperative collective efficacy	0.809	Yes
• Collective Problem solving	0.645	Yes
General Trust	0.765	Yes
Resources	0.744	Yes
Preparations		
• Planning preparations	0.891	Yes
• Property preparations	0.834	Yes
• Emergency kit	0.931	Yes
Preparation Inhibitors	0.816	Yes

The measures for AGENCY RESPONSIBILITY and COMMUNITY PARTICIPATION were excluded from further quantitative analyses because they did not exhibit sufficient internal consistency to warrant their inclusion. All other measures were utilised in multiple regression analyses of the predictors of preparations and, where appropriate, in structural equation modelling.

4.2.4.4 Calculation of variable scores

Following results from the factor analyses and internal consistency measurement, scores for all valid multi-item measures were obtained by summing the item responses. Items within

each measure used the same Likert scale and are considered to approximate an interval scale. Summing the item responses enables measurement of the latent variable assessed in each measure.

4.2.5 Addressing non-response bias

By only generalising results to the survey respondents, non-response bias has been avoided. Nevertheless, non-response bias can be assessed by a post-hoc assessment of householders who were approached to take part in the survey but who did not respond. While this assessment was not conducted, a comparison of gender, income, age and bushfire preparation level between early and late responders was conducted using the 2006 survey data. No differences were observed indicating that it is likely non-respondents would also display similar characteristics.

4.2.6 Quantitative analysis

Multiple regression analysis was used to identify quantitative variables that are predicting (driving) bushfire preparedness. Results from the qualitative analysis were used to select variables to test initially, but other variables whose importance has been identified in the hazard preparedness literature were also examined in a stepwise fashion in order to gauge their relative importance. Quantitative data can attribute quantifiable differences between the predictive strength of individual variables and therefore presents an important secondary indicator of which variables may be considered in the development of a preparedness decision theory.

Stepwise multiple regression was conducted with a total of 13 independent variables, eight of which influenced household bushfire preparations. The stepwise multiple regression method was used because it results in the most parsimonious model, where only variables that contribute significantly to the success of the model are included. Once any variable is retained (beginning with the variable that contributes most strongly to the model) the contributions of all other variables are then re-tested for significance.

Prior to conducting multiple regression analyses the applicable assumptions were tested. Data were found to be normally distributed, and linear. Only measures with high reliability

(Chronbach's α) have been used in the analysis, and reliability estimates for each variable are detailed in section 2.3.4.3. A small amount of data were found to be slightly heteroscedastic, meaning the variance of error changed slightly at different levels of some independent variables, but Tabachnick and Fidell (2001) note that slight heteroscedasticity has little influence on significance tests. Examination of collinearity revealed no instances of multi-collinearity. Tolerance statistics provided during stepwise multiple regression analyses fell well within the suggested range with values from 0.80 to 0.99 (low collinearity is indicated by tolerance values closer to 1).

The importance and activity of the predictor variables varied between years and survey locations. Variables found to predict bushfire preparedness included (see table 4.4): PREPARATION INHIBITION, INTENTIONS TO PREPARE, the AVAILABILITY OF RESOURCES needed to prepare, RISK PERCEPTION, SENSE OF COMMUNITY (sense of community – *place* and sense of community – *people*), NEGATIVE OUTCOME EXPECTANCY, and POSITIVE OUTCOME EXPECTANCY. Of the 12 variables tested, four were found not to predict preparedness including: CRITICAL AWARENESS of bushfire threat, AGENCY TRUST, COLLECTIVE PROBLEM SOLVING and SELF-EFFICACY. Models comprising some or all of the predictor variables are given for each year and location, followed by a description of each variable within those models from a quantitative point of view (see section 4.4). Variables that did not predict preparedness included collective problem solving among community members, trust in civic authority, critical awareness and self-efficacy and these are not addressed in the results section, but possible reasons why they were found not to be important predictors are discussed. The dependent variable used in all analyses was the level of preparation, taken as the number of preparations individuals "had done" (as opposed to those they indicated they "may do" or "will not do") around their households, as marked in the bushfire preparedness survey.

Table 4.4. Key predictors of bushfire preparedness as identified from both qualitative and quantitative analyses.

Variable	Qualitative	Quantitative
Outcome expectancy (negative and positive)	Yes	Yes
Sense of community (place and people)	Yes	Yes
Preparation inhibitors	Yes	Yes
Self-efficacy	Yes	No
Perceived severity of bushfire	Yes	No
Bushfire salience	Yes	No
Environment and bushfire weather	Yes	No
Fear of bushfire	Yes	No
Agency trust and responsibility	Yes	No
Intention to prepare	Yes	Yes
Risk perception	No	Yes
Availability of (information) resources	No	Yes

In all future references and discussion regarding the modelling, decision-making variables are instead termed “decision cues”, which provides a more accurate description of their role in the bushfire preparedness decision-making process.

4.3 Outline of Preparedness Decision Cues from Householder Interviews

4.3.1 Outcome expectancy

Interviewees generally reflected that outcome expectancy, or their belief in the effectiveness of preparing, was one of the primary considerations that influenced their bushfire preparation. Interviewees’ discussions about their outcome expectancy were invariably dependent on their general attitudes and beliefs regarding bushfire preparation, and their past experiences (or lack thereof). In particular, interviewees connected their outcome expectancy beliefs with considerations of bushfire severity and perceptions of property vulnerability.

Outcome expectancy (both positive and negative) for most interviewees was closely linked to a perception of the bushfire’s likely severity.

> *I mean doing the preparation I did last summer, I did sort of feel I took [the house] from a position of like, you know, this is totally undefendable to the situation where it’s like, well maybe if it was not the actual fire front coming through you could [defend successfully]*
>
> *Well, [preparation] just makes me feel a little bit safer. But bushfires being bushfires, you know even the best preparation in the world is sometimes not enough. Like the one up at [Scamander]*

This was also closely related to the general recognition among the interviewees that their preparations would be insufficient in the event of a 1967-sized bushfire.

> *See the '67 bushfire was just one out of a million, it's not something that you would probably expect to live through more than once in your lifetime… I just sort of realise there are some precautions that I can take which are sensible, and there are others that I can't cope with and at that stage I would just have to leave, and make sure the house is well insured*

As a consequence of this, most interviewees delay making any plan of action concerning the bushfire until they can see the fire and judge for themselves how severe the fire looks and what they will do. For some interviewees this would also mean they would not listen to the advice of fire authority representatives, or only consider the warnings from these representatives in light of their own assessments.

> *…when there was a fire on the mountain, and the fireys told me to evacuate, or told me to start my plan, which was to evacuate, I sort of didn't for a while – well I sort of packed up and then thought well I'll just see what happens, because the fire wasn't right there, it was sort of off over towards Glenorchy, so I thought I'd just wait and see what happens… It's always that question of how do you know when to do whatever you'll do?*

As a consequence, their outcome expectancy perceptions are influenced by both the extent of preparations they have made (or not made), and their observation of the fire's severity. Given that interviewees would wait so long to make the decision to stay or go they would be placed at significant risk – their preparations may be poor, and their chances of getting out of the house and to a safe place may be slim by the time the decision is made. When pressed on the safety of such action, most interviewees recognised the danger inherent in late planning, but showed little interest in or ability to change their habits. Recognising that their bushfire planning is questionable is likely to be influenced by the fact they were taking part in research about bushfire preparation, and may not reflect their actual belief, or any intention of altering their preparatory behaviour.

> *…you know, you've brought it to my attention again now, until I got [your] call [preparing] wasn't in my mind…*

Also, well-prepared individuals often discussed having less confidence in those preparations they have undertaken than individuals who are less well-prepared.

> *I think my preparation is better than the average… But I still don't feel confident, and that's psychological. It doesn't matter how well-prepared you are, that is going to be the stumbling block.*
>
> *I mean we've got huge gum trees on our property, and I just think, well if that goes up, then what's the chance?*
>
> *I think if you just try to clear rubbish away and do all the things you can, there's not a whole lot more you can, if you've done everything you can, um, I can't see the point of always worrying*

> *"…I keep the hedges and that trimmed up, I mean I don't really think we have to worry about it that much because it's always pretty tidy. So yeah, just keep the hoses there and that, on each end of the house.*

Their greater general knowledge about bushfire influences their choice to prepare, but it also informs them of how dangerous bushfire can be, and how difficult preparing for the defence of property is, and because of this these people are likely to be more concerned about the preparations they have made.

The inability to predict bushfire severity, and the corresponding "wait and see" approach to preparation and bushfire planning was evident in all but one interview. Even well-prepared individuals believed that in the event of a big bushfire their preparations would not be certain to guarantee their safety.

> *I think my preparation is better than the average, and everything's out and ready to roll from October right through to the end of April… Um, [but I have] an absolute horror of the sound of bushfire, and a sense of that, well you can do all the preparation in the world, but nothing can prepare you for what it's like when it actually hits you.*
>
> *…if a big fire came through, then we'd be in trouble… if it was looking really serious we'd just evacuate, if it was a case of a few embers falling down and that sort of stuff, then we'd probably stay and deal with [it], but if it came to the point where, you know a major fire front was approaching, or was likely to come to our house, we'd just evacuate*.

Fear would set in, and they may have readied the car as a part of their preparation and assembled a "go bag" in case their worst fears are realised.

> *…well I would try to stay with my house as long as I could… but saying that, I did have important documents and things that were in our home in a place that they could be easily removed quickly, so I guess in those terms I took precautions…*
>
> *…where I was living I had to make a decision very early about whether or not I was going to stay if a fire was getting close because it was a dead end, it didn't have any routes out of the place, so I had to be. I was either staying or I wasn't. So I always had a bag packed with a few things… so I had a contingency plan in place to grab them if necessary.*

With respect to the current Tasmanian risk communication material (which advocates the need to prepare regardless of the "stay or go" decision), these findings indicate that interviewees have not incorporated this information into their bushfire planning, even those who have said they watched the *Prepare to Survive* DVD and reportedly found it a good source of information.

> *I guess [the Prepare to Survive DVD] came with a little sleeve and I think that dot-point list was in the DVD too, or a letter that came with it, and that was pretty much what I used… [but] it depends on the fire. I think one of the main things, one of the main difficulties in the event of a fire would be knowing the severity of the fire and whether it was worth staying or going. In not a massive fire I think I'd feel comfortable trying to protect my property…*

Individuals who were knowledgeable about bushfire (knew about bushfire weather, where fires come from, how they behave and attack *etc*), and had experienced fire and the benefits

that preparing could deliver, developed strong positive outcome expectancy. These individuals were also very keen to share their knowledge and experiences with other community members in an effort to generate greater general bushfire preparation levels within their community. However, many interviewees had not experienced a severe bushfire and had little perception of what preparation could actually do. Consequently their confidence (even in extensive preparations) was generally low.

> *I've had indirect experience, but no direct experience or exposure at close quarters with fire… The motivation for [preparing] is largely driven by my knowledge of what lies ahead in terms of climate change and the increased likelihood or frequency of wind and wind linked with bushfire. I do find on those really hot days when the wind gets up, I feel sick in my stomach all day, whether I'm down at uni or at home. And I just don't think it's worth [the worry].*

Under these circumstances outcome expectancy can be strongly influenced by sense of community. Where there is community knowledge of bushfire and the importance of preparing, which is founded in experience of bushfire, there exist not only greater levels of preparation in the community, but greater confidence in those preparations.

> *Well, [the community has contributed] 100% [to our preparedness], if it wasn't for them I don't think we would have been nearly as proactive, we probably wouldn't have done anything about it… So, I guess I'm more confident even though you think about [fire] more, like some guys here have been in fires and you hear them talk about it, and you know it must just be horrific, and that's pretty frightening… If you think it's going to be awful and frightening, then at least you can be more prepared.*

Householders without experience need to hear that preparations work from their peers, rather than from fire service representatives, whose information is often viewed as theoretical and untested. Interviewees value information from their peers because they believe such information is based on experience, and has been used in real situations – they believe their peers are going to tell them exactly how preparing is going to help or not.

> *It was basically a few guys in the street are really enthusiastic about [preparing] and are ready to impart knowledge, and have a look at our pumps and all that stuff.*
>
> *…and one guy in particular worries about [bushfires] all the time, oh he's quite fretful about it, but you know he's good with information and that's why he's formed the fire group, so that everybody in Bracken Lane is in it, and we have a meeting about once a month.*
>
> *…and we do have a bit of a group in the street, one of the other guys is trying to organise a bushfire awareness [group], a bit of a plan to help one another…*

For some individuals, personal experience of bushfire also seemed to provide an idea of how ferocious a bushfire can be, and for them gave a good reason to prepare and contributed to their faith in preparation.

> *There's the ferocious nature of [fire]. The fact that how quickly it can spread, and how deadly it can be. It's one thing to watch it from a distance, it's another to be presented with a wall of flame and smoke and ash and the like, and realise how, ferocious is the best way I can explain it, it can*

be. So it's not something that you want to be presented with without notice, or without any planning.

Another interviewee reflected a contrary view of personal experience. His house was destroyed during the Hobart fires of 1967, even though he had prepared (though the exact nature of his preparations are unknown) and he expressed strong negative outcome expectancy as a result.

Preparing is a matter of individual inertia. We prepared, but got burnt out in 1967, so I don't think there's that much you can do. I take a very minimalist approach to preparing now, it' only a matter of time before we get burnt out again…

This raises the issue that each person has a unique perspective on what preparation means and beliefs about how valuable it can be. Distributing standardised risk communication information (as is presently the case) cannot address this variability between individuals, principally because each person brings to the preparation decision highly diverse experiences, attitudes and beliefs, so that generating a standard approach to preparation would be next to impossible. Also, while experience of bushfire is clearly important for the interviewees in this study, these findings also suggest that the influence experience has on interviewees' outcome expectancy is quite enigmatic and variable.

Growing up in the country, having seen them, being involved in burnoffs, seeing them get away. I don't think I have ever actually had to fight a for real bushfire. Certainly I spend a lot of time preparing for it…

…you know, one day the fire brigade knocked at our door and said, 'You have to be evacuated,' – we said, 'What? What for?'! And of course we were sitting in smoke, but we didn't think it was that close, and we had to be evacuated, and it really gave us a hell of a shock, and we said never again thank you very much…

I had a grandfather who lived in the Blue Mountains during the '63 fires, we were there at the time, I've lived in the [Dandenong Ranges], and I was a social worker at the burns unit of the Alfred Hospital. And I've got a mother who's a botanist, and a father who's a forester. I have an absolute fear of fires… I also work in climate change. I was a member of the Windemere volunteer fire-fighting brigade as the ladies auxiliary in the '80s, but I still don't feel confident…

I've had a strong experience where I wasn't prepared for the '67 fires and almost got burnt out… now I'm much more wary and prepared, but I'm still not feeling safe because I've had that experience.

Another factor contributing to outcome expectancy is house construction or a perception of the property's vulnerability. While many of the interviewees cannot readily address bushfire-prone house construction characteristics (most hadn't considered bushfire resistance when they bought; three had built their homes, two had built with bushfire resistance in mind), it does influence outcome expectancy both positively and negatively.

…the design of the house, it's quite tall, it's metal at the front, that doesn't burn easily, and it's two-tiered, so I can protect the bottom tier from the top tier without putting myself in the danger zone…

> *…the house site got burnt down completely in '67 …well this house I think would be fairly unlikely to burn down because it was built after the last fires (1967) with that in mind, and so it's brick with a flat roof and proper guards on it, and concrete deck, and it's got clear gardens around it, all that sort of stuff.*
>
> *It's a brick residence, tin roof. We don't have big piles of rubbish around, so we'd have a reasonable chance of defending the property.*
>
> *… I mean it's a brick house, it's only one storey, I think it would be pretty dependable.*
>
> *… well, given that services are available, like water and that, I think that my house would be defendable. It's double brick, it's surrounded by a clear path…*
>
> *[The house is] double storey with wood on the top and brick downstairs, so the flammable bits are really exposed. There's some of the roof area I can't get to, so to check the embers would be hard. And also because of the steep slope, where the fire would typically come from there's trees on the upside of the road that could easily generate flammable material that would come straight onto my house. It's not an easy property to protect, but none are I guess.*

People who believed their houses were innately resistant to fires (built of brick, metal roofs, *etc*) had higher positive outcome expectancy than people who believed their houses were hazardous (built of timber or surrounded by bush).

> *…I guess, I'm aware that once you've made a decision you stick with it, not try to run off at the last minute. I don't know, there's other factors with my house too. I've got areas that I can get out of the way, but they're not wise areas to go. I probably would stay, but I'm aware that's a pretty risky thing.*

People who rent had generally low self-efficacy and negative outcome expectancy as a consequence of this situation, simply because they felt they had little capacity to prepare (and successfully defend) the house they lived in.

4.3.2 Sense of community

Sense of community emerged from the interview data as a key driver of preparedness, with direct and indirect (for example through first influencing the formation of an intention to prepare) influence on interviewees' preparatory behaviours.

> *So yeah, I'm probably better prepared than anyone I know up there in my immediate vicinity, however, since I've got my tank in, two other neighbours have also put tanks in.*

For many of the interviewees, the social cohesion that comes with strong sense of community enables people to share the anxiety that comes with the threat (or even potential threat) of bushfire.

> *I'd probably, I don't know, it's tricky one, but I'd probably go because, well I live by myself and so I don't think I necessarily, because my parents are old, unless there's other people around me, I don't think I'd really want to necessarily do it on my own. If there was more than one person helping me, then I would probably stay, but I don't know whether I'd want to do it on my own.*

Interviewees worry less when there are people in their community they know they will be able to share their concern with.

…but the fact that there was actually another human being on site made like about 90% difference to me. In fact if I had just one more person there I'd feel, I would have no qualms at all, I would stay and defend and know my preparations would work.

…you know everybody worries about [bushfires], they want to pretend they don't , but they do… [and so you discuss sort of the equipment you could buy, or what you could do. Yeah [the community] is pretty good.

In effect, where there is strong sense of community, fear, worry and responsibility are shared among the community members, and the burdens presented by each become easier to bear. Also, while the fear of bushfires remains, having an active bushfire-prepared community enables that fear to be managed.

Well, I think with the fear I have also become more knowledgeable, so I guess if it did happen it would be horrendous, I've got some skills to cope with it, which I think is better than a fire coming one day and just not having a clue… So I guess I'm more confident even though I think… yeah it's going to be awful and frightening and stuff, [but] at least you can be more prepared.

Most importantly, people generally follow the lead of others and ideas about preparation diffuse through communities where there is a strong sense of community. For most of the interviewees, when asked about cues that influence their bushfire preparation, seeing, talking to, or being directed by others who prepare is extremely important and useful.

…and so we do have a bit of a group in the street. One of the other guys is trying to organise a bushfire awareness, a bit of a plan to help one another, and know when people are away.

…and I guess just good information on what happens in a bushfire, like what the fire service strategies are in dealing with situations… if they could get some community meeting or something where they said, well if there's a fire in your area you know this is where it's likely to come from, this is what we would most likely do, all that sort of stuff.

...if there was more than one person helping me, then I would probably stay, but I don't know whether I'd want to [defend the house] on my own.

…[we get most information] from our neighbours. I live in Bracken Lane and… everyone in the street is really into fire awareness and we've got a telephone tree if there's a fire, and we've had a few meetings over the summer talking about how to be prepared and that sort of stuff.

I think my activities maybe heightened their awareness. You see I act as a buffer between [the neighbours] and the Skyline Reserve, so they were delighted that I took the precautions that I did because I think it made them feel a bit safer.

We live in a pretty active community and word of mouth is probably the best way to find out about [preparing].

We had a couple of neighbourhood meetings about a different matter, but it was actually brought up, that maybe we should get some kind of plan about how we would support each other [in a fire].

The quality of this information seems to vary though. People who receive preparation advice from their direct neighbours have more locally relevant information than those who receive advice from family or friends who live in other areas. Non-local information seems to generate misperceptions about the nature of local bushfires and this can influence the extent and effectiveness of preparations. In localities where sense of community is lower, this latter type of information is generally what community members must rely on.

"…yeah you discuss the sort of equipment you could buy, or what you could do, it's pretty good. But by the same token, I think people worry a lot more unless you've got a lot of money, you've got a constant water supply, or a really good sprinkler system that you can operate in any sort of weather.

Would [the neighbours] be there to help? …it depends – you defend your own [property] first.

"[Would you ask your neighbours to prepare so that your place was safer?] I think I would only talk to them if I felt that it was very, very dry, or there were dead trees [on their property]… I probably should feel that I could approach them more generally. I guess I never really stopped to consider it.

"…and I mean in those sorts of circumstances people are doing their best to defend their own properties, so there's not going to be much in the way of help around.

Long-term residents who have experienced bushfire in their neighbourhoods showed a greater interest in forming cooperative relationships with their fellow community members.

We used to have a community fire guard, and that really helped us respond as a community – it takes the panic out of the bushfire season because most people are ready.

…there's not a great change-over of people here, like most of the people have lived here for 20 to 25 years… They [were] very welcoming and really, as a street, very proactive [in preparing] and community oriented…

There's strong community mindedness in our street to help with preparing, and that's come from the experience that the people here have had.

These respondents often recognised the benefit of collective action in fighting bushfires, and the value of solving such problems as bushfire preparedness as a group rather than as individual households. Interviewees with little experience of bushfire, but living in communities where there was considerable effort placed on community preparedness were more likely to have positive outcome expectancy (though for the more experienced residents' positive outcome expectancy drove their sense of community through responsibility to their neighbours, and recognition in the value of preparation), higher self-efficacy because they knew they could rely on the neighbours to help defend against a bushfire (and a higher corresponding level of social responsibility), greater ability to perceive risk from bushfires, stronger critical awareness, and more trust in the stay and defend message from fire authorities.

…if it wasn't for [the community] I don't think we would have been nearly as proactive, like we probably wouldn't have done anything about [preparing]… But I mean I think we'd certainly give [defending the house] a go, and we're certainly ready with the pumps and we know what we'd do…

I'm responsible for my preparedness and for the safety of my neighbours too, so I make sure I'm well-prepared. I don't think many people have the same attitude to preparing as me…

…I know people up the road a few blocks who would be in less danger [during a fire] because they're not quite on the edge of the [bush] like we are, so they're a few friends that I think I could call on to come and help.

Not preparing for bushfire is bad for the individual and the whole community.

…I think for me [being able to defend the house] would depend on whether the next-door neighbours are home, because I think when things get really, when you're up against it, you need someone with you. I think on your own you don't know when you've got to the point when

> *it's dangerous and I mean this staying in the house while [the fire] roars overhead, it's got me a bit shaky…*
>
> *…certainly discussions, and talking to neighbours over the fence. The people across the road organised a talk by the fire department last year. They [are] cues to rush out and [prepare].*
>
> *I talk to my neighbour. He was there when they had a fire 10 years ago, so we've talked about that and clearing and stuff…*
>
> *It was basically a few guys in the street [who] are really enthusiastic about [preparing] and you know, are ready to impart knowledge and have a look at our pumps and all that stuff."*
>
> *...well, we'd already done most of the things on the [Prepare to Survive DVD], it just reaffirmed we had the right idea… because we'd had those meetings… I mean, I wouldn't say we knew it all, but we were already pretty aware of the main things.*

Sense of community also builds risk perception, and ensures skills transfer between members of the community.

> [referring to previous residence] *I think the biggest factor there was, well I just wasn't so aware of [the threat of bushfire] there because we were closer to the city we felt safer, and it's south facing, so I guess I thought that was reassuring. But yeah…* [referring to current residence] *it's only our street, and there's not a great change-over of people here, most of the people have been here for 20 to 25 years. They were very welcoming and as a street, very proactive and community oriented I guess.*

Individuals with negative outcome expectancy were less likely to show interest in cooperating with or talking to the other people in their communities with regard to bushfire preparation, suggesting that once this attitude is formed, it is hard to overcome.

> *I think now that I've got to the age that I have, I mean I'm in my 60s, I think I would at first sign [of fire], I think I'd be gone… simply because if there was a gang of neighbours here who said they would all look after themselves, but it doesn't happen in this day and age… we don't even know our neighbours' names. We put ourselves out to try and speak to them, but people don't speak anymore. Even on the street here, people turn the other way.*

Sense of community and collective preparedness corresponded inversely to turnover of residents and was lower in recently established communities.

> [Do you prepare?] *No not really, I just block up the gutters and that if a fire comes…I mean I don't think we have to worry about it that much… I think people around me do their own thing.*
>
> *a lot of existing residents moved away after the fires of 1967, and there hasn't really been any big fires here since then, so I think we've lost a lot of that direct knowledge of what it was like and what to do.*
>
> *It's a pretty new suburb and you can tell that not much [preparing] is done there – untidy backyards = new arrivals, and that means there's increased risk from bushfire.*

In these communities, high turnover, or recency of settlement prevents the community from developing collective knowledge about bushfires or the value of preparing. Because sense of community is such an important driver of bushfire preparedness, in these communities some alternative mechanism must be employed to build a corporate body of bushfire preparedness knowledge. Interviewees make it clear that fire authorities should take a role in the development of collective preparedness ideas in these kinds of communities.

...and I guess [being given] good information on what happens in a bushfire, like what sort of fire service strategies are in dealing with situations – even if they could do that at a local level, if they could have some community meeting or something where they said. 'If there's a fire in your area this is where it's likely to come from, this is what we would most likely do', all that sort of stuff.

…advertising in the paper, or TV, I mean everything, because not everyone gets the paper everyday, and if anyone's like me, I don't get to sit down and watch the news everyday. I think it's something that should be brought to people's attention a little more regularly through the media, just because it's not on people's minds, they won't be thinking about it. You know, I don't think about bushfires.

Interviewees suggest that fire authority representatives could help by being more active during the winter, or simply being more available to discuss preparedness issues.

Well, actually seeing fire-men out and about doing controlled burning, sort of not in the peak bushfire season but it makes me, it's a memory jogger for – do I have the right stuff in a time when it's not high risk, so you do those preparations.

Between having children and school and working, you know, shift work, it's not something that you think about. You haven't got time to think about it! …maybe [visiting people more] is something [the fire brigade] should do. I've never in my life seen anything about bushfires until we got that DVD, and you know we sat down and watched that because we'd never had any information about [bushfire].

This does pose other problems however, and several interviewees suggested that the advice received from local volunteer fire-fighters was contrary to the messages from the professional services, and issues of agency trust are discussed further in sections 4.3.10 and 6.2.6.

Sense of community, and the interaction it facilitates between people (who have strong bonds to the other members) in the community context also builds collective self-efficacy. While it's clear that people like to follow leaders when it comes to finding out about and undertaking good bushfire preparations, it's also clear that having a good sense of community fosters positive beliefs about the value of staying to defend the property, and ultimately builds the collective efficacy of that community. This is especially true for older individuals, people with disabilities, and people living alone.

I'm on my own don't forget, and I'm a woman of close to 60, and I've now developed an ankle and foot injury… I think the thing for me is just being [at home] on my own… If in fact I had just one more person there, I'd feel, I'd have no qualms at all, I would stay and defend and know my preparations would work.

I guess our only factor that might change is the day… I've got a baby, so if I was home alone I might be a bit more, well it would depend on him really, if someone could come and get him, or whether I would feel like I could [defend the house] with him alone.

If there was more than one person helping me then I would probably stay [and defend], but I don't know whether I'd like to do it on my own.

If these members of the community know that they can obtain accurate information about preparing from their neighbours, or rely on help from trusted others when bushfire threatens, then they don't have to rely on their own capabilities solely, and this instils confidence and reduces their fear of bushfire as an unknown quantity.

> *I got caught up in a bushfire 26 years ago and I thought my time was up. It frightened the life out of me. And when I moved up here that was always in the back of my mind, and the fact that I'm retired, I've got time, and [preparing for bushfires] just makes sense to me.*

Familiarity with bushfire, and how to mitigate its effects, seems to reduce the level of anxiety people feel towards this hazard. Ryan and Wamsley (2008) showed that increased knowledge and familiarity with prescribed burning methodologies and activity could reduce residents' concerns about issues associated with fire.

4.3.3 Preparation inhibitors

Sixteen of the 19 interviewees from the study associated deciding to prepare with their decision about whether to stay and defend their properties.

> *I'd make some kind of preparation in terms of deciding to stay or leave, depending on the extent of the fire, and you know, if I was going to leave, try to decide what I would take and prioritise those sorts of things.*

As a consequence, the majority of interviewees who felt they would leave their property if threatened by bushfire were unlikely to make significant (from their point of view) investments of time or money into bushfire preparation (of the three remaining interviewees, two had made extensive preparations, including installing sprinkler systems, but one of these had negative outcome expectancy driven by low self-efficacy and a huge fear of bushfire).

> *…there is this absolute horror of the sound of a bushfire, and the sense of that, well you can do all the preparation in the world, but nothing can prepare you for what [the fire] is like when it actually hits you.*

The choice not to stay and defend, and the corresponding lack of preparation seems to stem primarily from several influential characteristics of people and their communities, including particularly people's inhibitions to preparation (factors like the cost, time involved, effort and skill required, the need to cooperate with others, and salience of bushfire).

Preparation inhibitors like the perceived cost of preparing the house, having the knowledge or physical ability to make the necessary preparations, requiring cooperation from others to make preparations effective, having time to make preparations, were recurring themes in peoples' reasoning behind not preparing, or making minimal preparations.

> *…the infrastructure things most people can't afford to do, like a water tank. They should subsidise [preparing] you know…*
>
> *Um, well [preparing] would depend on where [the fire] was and what it was doing. Um, what would I do? Um, I suppose I'm like, I mean a lot of it's dependent on, I suppose what I'm really saying is I don't know…*

> *Yeah, the neighbours have done a bit of work and created a fire trail [in the bush behind the house]…most of the houses where I am have a gate at the back fence, and the new owners of this part of the land have written to us, very nicely, and reminded us that it's private property and we shouldn't be accessing the back gates. You know, stay off. So it's going to be interesting to see what happens when the trail grows over.*
>
> *I'll prepare] if I've got the time. I'm always complaining that I don't have time for these things, but I guess I should have time for important stuff like that.*
>
> *Um, I'm on a very steep slope. [My house] is a double storey with wood on the top and brick downstairs, so the flammable bits are really exposed, there's some roof area I can't get to… It's not an easy property to protect, but none are I guess.*

For many of the interviewees, several of these factors acted concomitantly and were presumably influenced by peoples' perceptions of bushfire salience because these statements were often made alongside statements concerning the perceived importance of bushfire in the lives of those interviewees.

> [Why haven't you made more preparations?] *I guess, um, balancing the expense with the time to organise [preparation]… it would be great if there was some sort of greater incentive to do it."*
>
> *I suppose it's the same for a lot of things, that people don't do anything about lots of stuff until they're forced to or until they become closer to the issue themselves.*

Failing to prepare because of a lack of time or money for instance is exacerbated in those interviewees with negative outcome expectancy.

> *You've got to think of the practicalities of like, you know, could we defend the house, should we defend, is it worth trying to defend the house given that there's all sorts of structural features of the house that make it hard to defend.*

For some interviewees who were unsure about the value of preparing (neither positive nor negative outcome expectancy) for bushfire, these inhibitory factors simply convinced them that preparing was a waste of effort. For other interviewees, inhibitory factors like the cost of preparing were overcome by identifying the dual benefits that could be realised by undertaking particular preparation behaviours.

> *In any case …there's benefit in putting a rainwater tank in, so we plan to do it.*

For example, installing a water tank provides not only an alternative source of water from the mains supply, particularly in times of drought, but also provides an excellent supply of water to fight fires. On the other hand, many interviewees said that they would never outlay the money to buy a fire pump, simply because the pressure at which a fire pump operates would prevent it from being used elsewhere around the house or property.

> *…I actually made enquiries about [a fire pump], and you can't use it for your own house water, [because] it pumps water so fast that you can't use it for domestic use… And so it would mean having a pump that I couldn't use for any other reason than fighting a fire.*

The opportunity costs and benefits of preparing should be addressed by bushfire risk communicators in order to encourage preparation by overcoming these inhibitory factors.

4.3.4 Self-efficacy

It is evident that there is a close relationship between an individual's self-efficacy and their preparedness outcome expectancy. Even well-prepared individuals who live alone or felt their physical ability was too low to undertake bushfire preparations, can express low outcome expectancy, but this is principally linked to their beliefs that they lack the capacity to defend and actually see their preparations through in the event of bushfire.

> *…I live by myself and so I don't think I'd necessarily, because my parents are old, unless there's other people around me, I don't think I'd really want to necessarily do it on my own.*
>
> *I just can't live with that stress [during the bushfire season]… I'm on my own don't forget, and I'm a woman of close to 60, I've now developed an ankle and foot injury, which means my mobility [is going]. It's fine now, but I think long term, and I think anyone else, whether the it's a couple or a family, would have no problem, so it's largely driven by my lifestyle.*
>
> *I mean if I was younger and I had extra strength, then I'd stay and fight. I mean I had a property before this that was seven acres of bush, I would have stayed and fought that, but you know the older you get you don't have the strength and I think I'd go quick.*

Many people with low self-efficacy prepare, but place considerable reliance on family, friends or the community to help in the event of a bushfire to the point that without this assistance they feel preparing to defend would be impossible.

> *I've got a baby, so if I was home alone I might be more, well it would depend on him really if someone could come and get him.*
>
> *…when that last flare up that we had, I had to ring my son at uni and say come home! Well he's not living at home anymore and so I'm on my own.*
>
> *No, No. I think now that I've got to the age that I have, I mean I'm in my 60s, I think I would, at first sign I think I'd be gone.*
>
> *…because I'm now on my own, and because of my age, I think the best thing I could do if it ever came close to me is just leave.*

This link between self-efficacy and outcome expectancy (positive or negative) can also describe why individuals don't prepare – for example if the individual believes a fire may be very severe, if fire-fighting equipment is perceived not to work when needed, if the individual's house is built in a way that is not fire resistant (*i.e.* they have low self-efficacy), then the interviewee's outcome expectancy is likely to be negative, and their ideas about preparing as a good mechanism to mitigate the effects of bushfire will be low.

> *In a bad fire we're at its mercy. We can try and reduce our risk, but there's really not much you can do about it…*
>
> *It's double storey with wood on the top and brick downstairs, so the flammable bits are really exposed… It's not an easy property to protect. But none are I guess.*

4.3.5 Intention to Prepare

Intention to prepare is influenced strongly by outcome expectancy (negative and positive) and by sense of community.

> *I think if it was my house I'd probably set it up and defend it, I think you could do stuff to that house so that it would be defendable.*
>
> *...should we defend, like, is it worth trying to defend the house given that there's sort of structural features of the house that make it difficult to defend?*
>
> *...we have a vacant lot next door which has a frontage right next door us that has a narrow strip that leads into about 3000 square metres, the guy hasn't done anything [about preparing] for five years, to my knowledge, so I took it upon myself for our protection, to get in and do it.*
>
> *I don't know, if maybe you know there was some sort of local fire brigade, if they were more involved in trying to help people maintain their places, maybe cut back some trees that are hanging into the gutters or something like that, It's a bit of a mix between what someone could help you with and what you should probably do yourself sort of thing.*
>
> [Do you rely on your neighbours for help?] *"Yeah, they'd be here, I know they would. I mean they're a great bunch of guys. I've got nothing but admiration for them.*
>
> *On the one hand, individuals who have developed strong positive outcome expectancy are very likely to translate that outcome expectancy into preparation by first forming an intention to prepare. Individuals who feel that preparing will have no benefit for them if bushfire threatens are unlikely to form an intention to prepare.*
>
> *"We wouldn't [prepare], simply because if there was a gang of neighbours here who said they would all look after themselves, but it doesn't happen in this day and age.*

Similarly, individuals from communities where sense of community is strong are also more likely to develop intentions to prepare. While sense of community *place* seems to play a greater role in the formation of preparatory intentions, sense of community *people* is also important.

> *Yeah, I think I would just [prepare] because I'd want to protect an asset that I owned, whereas I mean I feel a bit embarrassed when I say that because it does sound really selfish...*
>
> *...we do have a bit of a group in the street, one of the other guys is trying to organise a bushfire awareness, a bit of a plan to help one another, and know when people are away.*

It is possible that although individuals develop strong attachments to the people in their communities, and rely on information transfer from them to help in bushfire preparedness, being familiar with a place and recognising the environmental threats, which that place can pose to life and lifestyle, is a stronger direct driver of preparation intention than receiving second-hand information from other members of the community.

> *...if it wasn't for [our community] I don't think we would have been nearly as proactive, like we probably wouldn't have done anything about [preparing].*
>
> *"[We'd prepare] because it's on bush frontage up a very steep hill, so my understanding is if it did get a light, um, it would burn directly up, it's quite steep,... and the house is right at the front.*

Sense of community *people* contributes to the intention to prepare by contributing to the community's ability to solve problems collectively by influencing people's perceptions of what the community can do.

But the difference is when I've had a friend here to help me get set up for the October fire which turned out not to be a problem, but the fact that there was actually another human being on site made like about a 90% difference to me.

"...I think when things get really [hard], when you're up against it, you need someone with you. I think on your own you don't know. You don't know whether you've got to the point when [the fire's] dangerous and I mean this staying in the house while it roars overhead it's got me a bit shaky, I don't think I could do that.

Sense of belonging, connection to people, and having confidence that information gained from peers in the community about bushfire preparation, all increase the likelihood that a community can work together to address the bushfire risk (or threat) facing them. It is clear that people like to follow the lead of others, and when asked about cues to their preparation consistently discuss their reliance or faith in the information provided by other more bushfire-experienced members of the community, or those members of the community who display more confidence in the ability of preparation to reduce the impacts of bushfire (*i.e.* those with stronger positive outcome expectancy).

...but you know he's good with [bushfire] information and that's why he formed the fire group, so that everybody in Bracken Lane is in it, and we have a meeting about once a month.

As noted in previous studies of bushfire preparedness (for example Paton*, et al.*, 2008a; Paton*, et al.*, 2006a) the intention to prepare is the key step preceding actual preparedness. In order to reach this point, householders must have overcome many obstacles that could prevent intention formation: they must have made some internal assessment of how well-prepared they are; they need to have considered what they must do to prepare; they need to have thought about how to prepare; and, they need to have reached the realisation that they may be threatened by bushfire at some point in the future, and that they are capable of doing something around their property that can mitigate this threat. Outcome expectancy and sense of community are the key mechanisms that interviewees related when discussing how they came to be at the point where they had developed a mindset that permitted effective preparation, which entailed meeting and overcoming those obstacles that may otherwise lead to a decision not to prepare.

4.3.6 Perceived severity of bushfire

Perceived severity of fire also influences preparedness behaviour. Many interviewees felt that preparing to defend a house in the event of a large bushfire would be almost impossible.

There's the ferocious nature of [fire]. The fact that you know how quickly it can spread and how deadly it can be. It's one thing to watch it from a distance, it's another to be presented with a wall of flame and smoke and ash and the like, and realise how ferocious – it's the best way I can

explain it – it can be. So it's not something that you want to be presented with without notice or without any planning.

The only real problem is if you've got conditions like they did in Canberra. You know, with a few [really hot days] you'd have to seriously think about leaving, because I don't think anything could stop that. If [the weather] was really seriously bad over a period of a week, you know, really bad conditions, we'd have to consider evacuating before [the fire] even got here.

…I think it would be possible to defend [the house]. But I mean, see we've got in our back garden, we've got two, geez I don't know how big they are, they're like 30 metre trees, and to be honest, if they caught fire, you know, they started throwing stuff everywhere, I don't think I'd want to stay and try and defend [the house]. Actually, having thought about it, looking at those trees I don't know that we would be able to if they caught fire.

These feelings seem to be driven by a mixture of negative outcome expectancy and low self-efficacy.

I think my preparation is better than average, and everything's out and ready to roll from October, right through to the end of April… But I still don't feel confident, and that's psychological. It doesn't matter how well-prepared you are, that is going to be the stumbling block.

Interviewees know that preparing is the right thing to do, and that there is some level of expectation on them to make preparations.

What do I do? I don't feel there's much I can do in terms of protecting my house apart from keeping the grass low… I don't know, it's really up to the individual I guess… maybe if there was some sort of local fire brigade, if they were more involved in trying to help people maintain their places… It's a bit of a mix between what someone could help you with and what you should probably do yourself…

As a result these individuals make minimal preparations, limited by preparatory inhibitors and by their desire not to over-invest in an activity in which they have no confidence. Minimal preparations might include packing the car as a last-minute escape mechanism, or a variety of "soft" preparations described in section 3.4. While their minimal preparations would be suitable for defending the home against a small fire, if the approaching fire is perceived to be severe, they're willing to risk leaving at the last minute, in some cases contradicting their desire to stay and defend with a plan to leave in the same sentence.

…probably if it was looking really serious we'd just evacuate. If it was a case of embers falling down and that sort of stuff, then we'd probably stay and deal with it. But if it sort of came to the point where, you know, a major fire front was approaching, or was likely to come to our house, we'd just evacuate.

if it was bad, I'd just pack the dogs up and pick the kids up, grab the photos and go. I wouldn't care.

No, I was going to stay if a fire was getting close, because [I live at] a kind of dead end, it didn't have many routes out of the place, so I had to be. I was either staying or I wasn't kind of thing. So I always had a bag packed with a few things, and I've got pets so I had a a contingency plan in place to grab them if necessary.

These interviewees are hedging their ability to defend their home (perceived as limited) against the possibility that if they cannot (perceived as high), having the car (or some other escape measure) ready to go at the last minute will be their alternative course of action.

These minimal preparations may be ineffectual and dangerous in a larger bushfire, but they are perceived as sufficient and are believed to constitute actual preparedness by the interviewees conducting them.

> *…well you don't really prepare until it's on your doorstep do you?...And I've got stuff packed away that if we have to evacuate I can take.*
>
> *I'd make some kind of preparation in terms of, um, deciding to stay or leave depending on the extent of the fire.*

By contrast, people may not choose to make extensive preparations around the home if doing so acknowledges the future possibility of facing direct bushfire threat. This admission is difficult for some, and making minimal preparations allows them to avoid even thinking about this eventuality.

> *The thought of a big fire scares me a lot. I prepare, but my first thought would be to get out at the first opportunity. I think we could manage a small fire, but a big one would just be too much…*

Risk communication techniques can play a major role in influencing preparedness, but may be hindered by the misinterpretation of the risk message by householders. Individuals' ideas of what preparation actually means differs dramatically. For people with knowledge about preparing or experience of the value of preparing, making bushfire preparations includes behaviours that range from maintaining a defendable space to installing sprinklers or buying a fire pump.

> *Well, we've only just moved here nine months ago, but we've put in two large water tanks, and we've bought a water pump, a diesel-driven pump, and we've cleared lots of trees that were near the house… And we've got a plan if there's a fire… and you know we've got clothes that we're going to wear, and boots and mask and drinking water and all our important documents and stuff like that.*
>
> *[We were] the first ones in Tasmania who would have, many, many years back, put sprinkler systems, automatic sprinkler systems onto the roof. So when the bushfire was about 200 metres away in October (2006), we just had to put the house under water. So we're really well-prepared.*

At the other end of the preparation continuum are those who believe being prepared means having a hose long enough to reach the back fence.

> *I was on my own here, so yeah, it was more a matter of make sure the hoses were in the right spot, that's all we could really do.*
>
> *I don't perceive the danger high enough to go and do something about [preparing]… [but], I've just got a couple of hoses there handy.*

Interviewees also seemed to confuse the "leave early" message contained in the risk communication information stating that, even though they had watched and "understood" the *Prepare to Survive* DVD, they would still wait until the last minute to make the decision about

whether they would stay and defend their home or leave, decisions based largely on their thoughts about bushfire severity.

> *I guess [the Prepare to Survive DVD] came in a little sleeve, and I think that dot-point list in the DVD was good, and that was pretty much what I used… But my plan is to stay, but yeah, I guess I'm aware that once you've made a decision you stick with it, not try to run at the last minute.*

So, while these risk messages seem to be clear and straightforward (and ostensibly getting through e.g. EMRS, 2007, 2008), each individual interprets them differently, and as evidenced by this data, often mistakenly. For example, "Megan" acknowledged receiving, reviewing and understanding the *Prepare to Survive* DVD noting that "*My plan is to stay, but yeah, I guess, I'm aware that once you've made a decision you stick with it, not try to run off at the last minute*". Yet in the following sentence she identifies that her choice would depend on whether the fire was severe or not - "*It depends on the fire. I think one of the main things, one of the main difficulties in the event of a fire would be knowing the severity of the fire and whether it was worth staying or going. In not a massive fire I think I'd feel comfortable trying to protect my property*." While she seems reasonably confident about staying in the first sentence, this belief is clearly based on thoughts about a less severe fire. Presented with a severe fire, a short distance from her home, it is more than likely that Megan would choose to flee.

4.3.7 Bushfire salience

Salience of bushfire is generally low among the interviewees. This is probably due partly to the uncertainty of seasonal bushfire, and the reality that most people have many other issues that must be dealt with in daily life.

> *I suppose it's different because now it's autumn and we're going into winter, whereas if it's those really dry early summer days , then I would probably be more worried right now.*
>
> *I think it's fairly sporadic, maybe there are a couple of people around who are probably well [prepared], but most people would fall into my bracket.*
>
> *It's the attitude of people, after a couple of years after there was a bushfire they forget about it, you know, I'm rather frustrated by this!*
>
> *No, you don't worry about it at this time of the year, you know when the weather heats up you get quite anxious, everybody does.*
>
> *Yeah, that's it, we don't worry about it. If it happens, it happens. There are a lot of other things [apart from bushfire] that we could worry about, but we don't.*

Low salience means that people generally begin to think about preparing only when they are actually threatened, and so bushfire salience is therefore closely associated with perceptions of bushfire severity.

> *I've lived here my whole life, and [bushfires] are just a part of life. You know, I expect to see the first bushfire on the mountain or on the Eastern Shore and then the summer's started hasn't it?*

Under these circumstances stress can affect decision-making as people must undertake many activities in a short time. As a consequence, people in these situations may be more likely to flee their homes at the last minute because they perceive that what little they can do in the short time available to them is unlikely to increase their ability to defend their home successfully.

> *That's the critical thing, and that's where I probably don't have a good answer. My plan is to stay, but yeah, I'm aware that once you've made a plan you stick with it, not try to run off at the last minute.*

Depending on the speed of the fire's approach and access to the property, this can be a very dangerous decision.

Several interviewees note that the annual Tasmania Fire Service warnings at the start of the bushfire season (probably aimed at increasing salience of bushfire threat to encourage preparedness) are often ignored and actually reduce salience over the longer term, suggesting that the service is "crying wolf" because rarely do the service's (often dire) predictions of the impending bushfire season eventuate.

> *Other neighbours, they hear the warnings, but I think other people are a bit blasé. I truly think they are. It'll happen one day, and they think, 'Oh shit, we should have done something'.*

In this case people consider these warnings in the context of their own areas, and if no bushfires threaten them in a predicted "bad" season, then future warnings are likely to be disregarded. Fire services must necessarily talk in general terms about the severity of the coming bushfire season, and providing community-specific risk information is difficult, but by distributing generalised warnings, some people receive information that is applicable to them, while others do not. So while risk communication can help people to anticipate bushfire threat, thus develop greater salience of bushfire, environmental variability means that bushfire threat cannot be equal throughout a region, which then poses difficulties for risk communicators.

People also reason that if bushfire is not a salient threat, then there is little point spending time and money on preparations whose value and purpose may never be realised.

> *…I suppose it's good to be optimistic about these things, but I do feel in a sense that I'm not overly prepared for it… And I guess it probably only takes a few hours of my day… and if I've got the time. I'm always complaining that I don't have time for these things, but I guess you should have time for important stuff like that.*

People don't do anything about lots of stuff until they're forced to or until they become closer to the issue themselves… it's a bit like car accidents and stuff, you kind of don't do much about it until someone that you know, even then, people get slack again after a while in terms of how they drive or whatever.

I've lived here my whole life, and they're just a part of life… there are a lot of other things we don't worry about as well but we could.

Preparation inhibitors are likely to be affecting most people when they are deciding to prepare, but for people with low bushfire salience, inhibition is particularly important. That bushfire is not a salient threat to many of the interviewees (because of its uncertainty and unpredictability) ensures preparation is inhibited by perceptions that preparing is expensive or time-consuming.

4.3.8 Environment and bushfire weather

Most interviewees describe changes in environmental conditions or the arrival of weather associated with bushfire as significant cues to their preparation.

I guess we only really think about preparing when we're threatened, you know, when the weather's hot and dry and it's windy.

When the smoke comes down the valley! That makes you go 'Oh, shit where are those hoses'!

I think the hot winds are my cue to prepare. That's the main thing.

My bushfire preparation is totally weather dependent.

People living in areas where there is a strong sense of community, and where information about bushfire preparation is readily shared, take their cues from others in the community, and are generally better prepared before these environmental or weather changes become evident.

We [the community] talk a lot about bushfires and we're quite concerned, and everyone starts preparing in spring.

My community's very friendly and involving so we help one another out when it comes time to prepare, and we get into it as soon as we get into the warmer months…

However, some individuals who cannot rely on others within their community for information recognise changes in the environment directly.

People use a variety of environmental or weather cues, some of which provide more time to prepare than others. Observations of the increasing density of the bush under-storey or a drying of the vegetation represent early indicators that some people use to ensure they are well-prepared when bushfire actually threatens.

…we do lots of walks on the mountain and some of the fuel in the under-story, you know there's just piles of it, and you think, 'Oh my god – somebody should come and rake this up!'

…every summer you see stuff – you know, the vegetations dries out and you just sort of know it's the [bushfire] season.

On the other hand, extremely hot days, days with strong winds, or observations of smoke nearby are poor (late) indicators of bushfire threat, that when detected are likely to increase stress, result in ineffective preparations, or provoke people into leaving their homes late.

A few days of really hot weather and we start thinking about what needs to be done around the place…

So when a hot northerly blows, then that's bushfire danger all around us.

But the trigger to [prepare] is to look out the window and see smoke.

Even so, these latter cues were mentioned regularly as factors that influenced interviewees' preparedness activities, which is associated with the inappropriate assumption that these cues provide sufficient time to act.

Conscious observations of the changing environment/weather conditions (as described above) increase people's beliefs about the salience of bushfire, and this in turn leads people to develop a greater sense of the necessity to prepare. Although bushfire occurs most readily under certain environmental conditions, there is no certainty that if these conditions are met then bushfire will be inevitable. People often deal with this uncertainty by waiting until bushfire threat cannot be denied. Without clear evidence that bushfire is extremely likely and therefore a salient threat, it is difficult for individuals whose preparation is inhibited by lack of time, money or by physical capacity to actually address this threat.

4.3.9 Fear of bushfire

It is clear that the annual threat of bushfire causes fear and anxiety for many householders living in peri-urban areas. For some, the fear is associated with loss of property or life, but others fear the bushfire itself.

I drove up to St Helens you know and it's pretty shocking when you see that sort of destruction that a fire can do.

We came from Germany and we just thought if we have a good house we have to protect it, and we heard about these bushfires and we were really scared, and so we did our utmost you know. So I think preparation is everything.

There's the ferocious nature of it. The fact that how quickly it can spread, and how deadly it can be. It's one thing to watch it from a distance, it's another to be presented by a wall of flame and smoke and ash and the like…

In a bushfire you're mugged by the environment, but you stand to lose considerably more than in a burglary for instance. It's a different type of experience, and it's emotionally draining.

I don't think of myself being burnt and worry about that, it's more to do with the noise, the speed, and being surrounded by fire and trapped.

In the same way that individuals fear different aspects of the bushfire hazard, these fears are also translated into different preparatory actions. Individuals who possess a strong positive outcome expectancy or who reside in communities where there is a strong sense of community are likely to offset their fear by ensuring they are well-prepared, or by sharing the burden of fear with other like-minded or supportive people.

> *I've got a beautiful celery-top house, which I love, and that's what scared the life out of me when it came forward – because I thought the house was vulnerable being made of wood, and so you know I've done things like have my gutters enclosed, so that sparks can't go in there.*
>
> *The stumbling block for me is psychological, not physical, not lack of preparedness…*
>
> *[My] concern about fire has increased with this newly garnered knowledge from the community, [but] I think with the fear I have also become more knowledgeable, so I guess although if it did happen it would be horrendous, but I've got some skills to cope with it…*
>
> *It's one thing to watch it from a distance, it's another to be presented by a wall of flame and smoke and ash and the like, and realise how – ferocious is the best way I can explain it – it can be. So it's not something that you want to be presented with without notice or without any planning.*

These individuals rely on effective personal and/or community mechanisms (like outcome expectancy and sense of community) to spur their actions. Individuals who don't have knowledge of preparations, and who can't share information about the effectiveness of those preparations with other members of the community, are often less likely to undertake protective behaviours, and are likely to avoid the issue altogether.

> *I'm not that sure that preparing puts you in a better position – if the fire's big it will probably burn your house down anyway.*
>
> *I couldn't deal with a fire and would go as soon as I heard about one. There's not much you can do in a big fire.*

For individuals with a fear of bushfire, risk communication that relies on images of bushfire threatening property may exacerbate the problems, causing people to avoid the issue altogether.

> *All I got from the [Prepare to Survive] DVD was a lot of fear.*

4.3.10 Agency trust and householder responsibility

For interviewees living in communities where there was a weak sense of community, rather than sharing their concern about what to do in the event of a bushfire, they transferred the responsibility of preparing onto the fire services.

> *I think this is a unique suburb where people have fortunately got larger blocks and they are surrounded by trees – see, I can't even see my neighbour unless I peer through the trees. Um, in fact the guy's house I'm looking at now, I wouldn't even know his name… we're lucky to have our own fire station just down the road, and I guess that gives us some confidence that there's obviously guys living around here with a professional knowledge of what to do.*

The transfer of responsibility to fire services is exacerbated by some branches of the services themselves (particularly the volunteer services).

> *I rely heavily on the local fire brigade. They've got a lot of expertise, and in recent years there only has to be a whiff of smoke up here and they're out in force, so I've got quite a bit of confidence [they'd be here to help].*
>
> *…the first thing I did was get the fire chief up here to look at my garden, and I was more worried about [preparedness] than he was!*
>
> *…we asked [the volunteer brigade] and they said our place was alright… [but] I just think you never know what a fire's going to do, and for them to say, 'Oh you're alright', I mean we've got huge gum trees on our property, and I just think, well if that goes up, what's the chance?*
>
> *I think if I didn't lose my nerve I'd be fine – the fireys think I'm worrying unnecessarily…*

Several interviewees, who had sought help from local volunteer fire service representatives, mentioned that after asking whether the preparations they made were sufficient, were told that in the event of a bushfire the volunteer fire brigade would be there to help.

> *Look, I don't know. The fire brigade were here the other day for another reason, they made no, they said the place is fairly safe.*
>
> *You know, you really don't have to worry about [preparing] unless you've got a bushfire coming, unless the bushfire chief said, 'Look, we'll be here, you don't have to worry about it.'*

While this possibility exists, it is by no means a surety, and served only to reduce the salience of bushfire and therefore the interviewees' compulsion to prepare themselves.

> *No [we don't do more], we're lucky to have our own fire station just down the road and I guess that gives us some confidence that there's obviously guys living around here with a professional knowledge of what to do [in a bushfire].*
>
> *I think I'd need the help of the fire brigade to be honest… [Would they be there for you?] Ah, yeah, I'm pretty sure, they're pretty good… they're about two seconds away. They'd be here, I know they would. I mean they're a great bunch of guys, I've got nothing but admiration for them.*

By contrast, other more knowledgeable and well-prepared interviewees recognised this as a false assurance, which only served to reduce their trust in the fire services.

> *…we've had a few meetings over the summer talking about how to be prepared and that sort of stuff, when the fireys came along and told us that there'd be enough water and don't worry, everyone said, 'Yeah right!!'*

4.3.11 Summary of key constructs

The 10 variables discussed here play roles of varying importance in the prediction of bushfire preparedness, but may be considered the key constructs emerging in the development of a decision about bushfire preparedness. These constructs have been identified from interviewees directly, who related personal thinking (cognition) about bushfire preparedness. Each interviewee considers most, if not all, of these constructs as having some importance in

influencing their preparedness decision, suggesting they form the backbone of a generic decision-making process that leads people to choose to prepare or not to prepare for bushfire.

The two most important constructs, and those which essentially begin the bushfire preparedness decision process, are outcome expectancy and sense of community. Both of these constructs can be separated dichotomously, and while the two aspects of sense of community (place and people) play different but mostly positive roles in influencing preparedness, positive and negative outcome expectancy are the key determinants of a choice to, or not to, prepare respectively. Based on the qualitative data presented here, positive and negative outcome expectancy may influence bushfire preparedness directly and indirectly through both aspects of sense of community.

Preparation inhibition is a construct that mediates the relationship between householders' negative outcome expectancy and the decision to prepare by amplifying beliefs about the "folly" of making bushfire preparations. Not previously examined in a bushfire preparedness context, this construct describes the primarily mechanical factors that may prevent preparation, including: cost of preparing, need for assistance from others, lack of knowledge about preparing, or physical inability. The significance of inhibitors such as these is that while people may realise they should prepare, if they don't have the money or the physical ability they perceive they would need to prepare, then they believe they would be incapable of preparing, and consequently invest little time or effort in making bushfire preparations.

From the interviews it is possible to infer that low self-efficacy often hinders preparation, and interviewees state that having other people around is an extremely important requirement they consider when thinking about bushfire preparedness. This collective requirement suggests the need to include another construct that describes the interdependence that many community members require in reaching strong preparedness levels: collective problem solving. That collective problem solving was not identified in the qualitative analyses may suggest that interviewees find it more difficult to articulate it as a concept, focussing more on their own handicaps, rather than the ability of their community to provide an important support system. Collective problem solving incorporates aspects of collective efficacy, so while self-efficacy arose as a relatively important qualitative predictor of preparedness, what is actually

important is people's beliefs that they can rely on other people around them to help in the case that bushfire threatens. This can be represented more effectively using collective problem solving than self-efficacy, and consequently this construct is examined alongside self-efficacy in the quantitative analyses (see section 4.4).

Intention to prepare is identified as playing a key mediatory role between outcome expectancy and sense of community and bushfire preparation, but not all interviewees reflect on this construct with the same level of importance – some suggesting that low confidence in preparations directly prevents them from preparing, or that hearing about the value of preparing from trusted neighbours is a direct encouragement to prepare.

Likewise, perceptions of bushfire severity, fear of bushfire, agency trust and responsibility, and environment and bushfire weather are all discussed by most interviewees, but with varying degrees of consequence for/in individual circumstances. In the case of these constructs, the relevance to all interviewees (and by extrapolation to all people living at risk of bushfire) exists, but plays differing roles.

The grounded theory analyses conducted in this section have focussed partly on identifying these key constructs, but also on exploring the causal relationships between these constructs. Part of the descriptions of each of the constructs above includes an examination of what the construct is influenced by, and what other factors the construct influences. Identifying these causal relationships is a crucial step in the development of a model representing the bushfire preparedness decision process, because it demonstrates how the individual's cognitions can affect other components within a decision process.

The qualitative findings discussed in this chapter were used to refine the selection of variables used in the quantitative analyses of the predictors of preparedness examined in the next section. Additionally, other variables including critical awareness, risk perception and the availability of (information) resources are also included in this analysis because of their importance in previous examinations of natural hazard preparedness. It is important to note that not all of the key constructs could be examined using the quantitative survey data collected in Hobart and Sydney, which are explored in the following section (4.4). Psychometrically valid survey data were not specifically collected for perceived bushfire severity, fear of bushfire, bushfire salience, and environment and bushfire weather. Survey

measures exist for the first three of these constructs, and should be included in future surveys of bushfire preparedness.

4.4 Preparedness Decision Cues Observed from Survey Data (2006 and 2007)

Of the 12 decision cues tested as predictors of bushfire preparedness, only eight were found to help account for differences in levels of preparedness when examined using a step-wise regression analysis (R_{adj}^2=0.327). These decision cues included preparation inhibition, intention to prepare, outcome expectancy (positive and negative), sense of community (people and place), resources available for preparation, and risk perception. The relationship between these eight predictors and bushfire preparedness was a significant one ($F_{8,983}$=61.152, p<0.001).

The relative importance, and influence, of these decision cues contrasted between years and between cities. Of the eight, preparation inhibitors and the formation of an intention to prepare were consistently the two most important predictors. Preparation inhibition was consistently the strongest negative predictor, while intention to prepare was consistently the strongest positive predictor. Decision cues found to be predicting bushfire preparedness in each city are provided, followed by a description of each decision cue from a quantitative point of view.

4.4.1 Hobart 2006

From the surveys conducted in Hobart in 2006 seven decision cues were found to influence survey respondents' bushfire preparedness. In order of relative importance these decision were: preparation inhibitors, intentions to prepare, positive outcome expectancy, resources available for preparing, sense of community *place*, risk perception, and negative outcome expectancy.

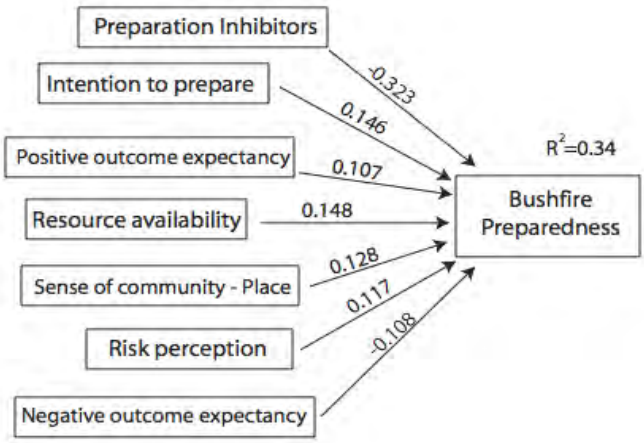

Figure 4.1. Variables predicting bushfire preparedness in Tasmania in 2006. Beta weights of each independent variable are provided to identify the relative importance of each independent variable on bushfire preparedness (+1.0 greatest influence, -1.0 least influence).

Together these decision cues could account for 34% (R_{adj}^2=0.336, n=416) of the variability in preparation levels (Figure 4.1).

The overall relationship described here was strongly significant ($F_{7,409}$=30.3, p<0.001). When all other decision cues are held constant, bushfire preparation was negatively related to preparation inhibition and negative outcome expectancy. The remaining decision cues increased the likelihood that respondents from Hobart would prepare in 2006, with intention to prepare the most likely to increase bushfire preparedness.

4.4.2 Hobart 2007

In the 2007 Hobart survey respondents' preparedness levels were predicted by only three of the original independent decision cues: intention to prepare, preparation inhibitors and

positive outcome expectancy. A fourth decision cue, sense of community *people* was also found to be a significant predictor of bushfire preparedness. These four decision cues predicted a greater proportion of the variability in respondents' bushfire preparedness than in the previous year (Figure 4.2), describing 38% of the variability (R_{adj}^2=0.383, n=327).

Figure 4.2. Variables predicting bushfire preparedness in Tasmania in 2007. Beta weights of each independent variable are provided to identify the relative importance of each independent variable on bushfire preparedness (+1.0 greatest influence, -1.0 least influence).

The variability predicted by this relationship was slightly stronger than in 2006, and was also significant ($F_{4,323}$=51.6, p<0.001, n=327). Unlike in 2006, preparation inhibitors alone are operating to reduce bushfire preparedness. Intention to prepare, sense of community *people*, and positive outcome expectancy are all increasing the likelihood that survey respondents would have undertaken bushfire preparations.

4.4.3 Sydney 2007

Bushfire preparedness in Sydney was predicted by three decision cues only. Intention to prepare, preparation inhibitors and negative outcome expectancy described 31% of the variability in Sydney respondents' bushfire preparation (R_{adj}^2=0.314, n=211) (Figure 4.3).

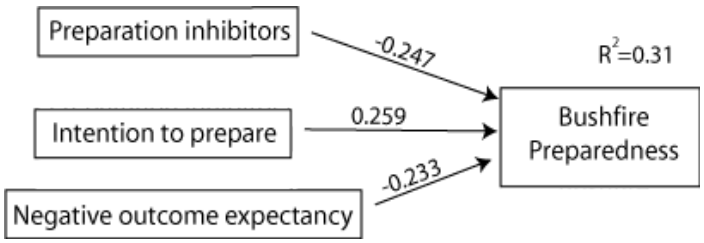

Figure 4.3. Variables predicting bushfire preparedness in Tasmania in 2007. Beta weights of each independent variable are provided to identify the relative importance of each independent variable on bushfire preparedness (+1.0 greatest influence, -1.0 least influence).

The three decision cues driving bushfire preparedness in Sydney predicted a similar proportion of the variance (31%) as in the 2006 Hobart sample (34%) where seven decision cues were operating. The stepwise multiple regression methodology used here ensures only decision cues contributing significantly to a model are used, so while other decision cues may increase the proportion of variance described in this model, these additions were not significant. In the model presented here the relationship between intention to prepare, preparation inhibitors and negative outcome expectancy was a highly significant one ($F_{3,208}$=34.7, p<0.001). In this model only one decision cue, intention to prepare, is operating to increase respondents' bushfire preparedness.

4.4.4 Quantitative decision cues predicting bushfire preparedness

4.4.4.1 Preparation inhibitors

In Hobart 2006 and Sydney in 2007 preparation inhibitors were found to be the most important driver of bushfire preparation. This decision cue was developed after analysing results from the in-depth pilot interviews conducted in early 2006, and adapted from studies examining the effects of social conflict and resource constraints on preparedness (Abraham, *et al.*, 1998; Lindell & Whitney, 2000). Preparation inhibitors have since been established as a

significant mediator between beliefs about negative outcome expectancy and bushfire preparation (Paton*, et al.*, 2008a).

The preparation inhibition measure asked survey respondents to rate the likelihood (from “not at all” to “a great deal”) that cost, skill or knowledge, time, physical ability, and the need to co-operate with neighbours would prevent them from preparing for bushfire. Up to half of all respondents felt that each inhibitor would have medium to “a great deal” of impact on their preparation (cost-40%, skill-39%, time-56%, physical ability-44%, and co-operation-42%). Ten percent of individuals felt that physical ability would prevent them from preparing “a great deal”, while just over nine percent of respondents felt time would prevent their preparation “a great deal”. Only 21% of respondents indicated time would have no impact on their preparation. The proportions of respondents indicating other inhibitors like cost (37%), skill (31%) and cooperation (34%) would have no impact on their preparation were somewhat higher.

These results are somewhat contradictory to results from section 3.3.1.1, which identified that there was no significant relationship between income and preparation. The results presented here are a more direct indication of how householders feel about certain important characteristic that limit their preparation, while results presented in the previous chapter are merely relating correlational data.

4.4.4.2 Intention to prepare

The importance of the intention to prepare decision cue has been identified in previous research on natural hazards including bushfire (Paton*, et al.*, 2006a; Paton*, et al.*, 2005). In Hobart in 2007 intention to prepare was the most important decision cue predicting bushfire preparedness (ß=0.329) and the second strongest predictor in Hobart ’06 and Sydney (respectively, ß=0.146 and ß=0.259). This decision cue was composed of two items (see section 2.3.4.2), measured on a three-point scale (see section 2.3.1.11) that examined respondents’ actual intentions about whether to check or increase levels of bushfire preparedness. Most people reported they would “definitely” check their bushfire preparations (67%) before the bushfire season. Fewer respondents (57%) reported they would “definitely” increase their preparedness levels, with a third of respondents (34%) indicating they would

"possibly" increase preparation levels. These patterns in preparation intentions were generally similar between years in Hobart and between Hobart and Sydney. Eight percent of respondents reported they would not check their preparations prior to the bushfire season, and 10% reported they would not increase their preparation levels. This would suggest that around 1 in 10 individuals living in at-risk bushfire areas of Sydney and Hobart are comfortable with their level of risk.

4.4.4.3 Negative outcome expectancy

While negative outcome expectancy was one of only three predictors of bushfire preparedness in Sydney (ß=-0.233), it was of lesser importance in Hobart '06 (ß=-0.108), and did not predict preparedness in the Hobart '07 survey. Negative outcome expectancy was composed of four items measured on a five-point scale (see section 2.4.3.2). Most respondents "strongly disagreed" with the statements that bushfire was too destructive to prepare for (60%), and that there would be no destructive fires during their lifetime (62%). However, around one quarter of all respondents "agreed" or "strongly agreed" that preparing was both inconvenient for them (25%), and was a difficult activity to accomplish (24%).

In Sydney slightly fewer respondents "strongly disagreed" that bushfire was too destructive to bother preparing for (55%), and that there would be a serious bushfire at some stage in their lives (54%). Also, a slightly larger proportion of respondents believed preparing for bushfire inconvenienced them (26%), and that it was difficult to prepare (28%). In Tasmania larger proportions of respondents "strongly disagreed" that bushfire was too destructive (58%-06, 65%-07) and that there would not be a serious bushfire in their lifetimes (65%-06, 64%-07). Also, fewer Tasmanians "strongly agreed" preparing was an inconvenience (22%-06, 21%-07) and that it was difficult (22%-06, 19%-07).

4.4.4.4 Positive outcome expectancy

Positive outcome expectancy only predicted bushfire preparedness in Hobart. In both 2006 (ß=0.107) and 2007 (ß=0.176) it was the weakest positive predictor of bushfire preparedness. Overall respondents "agreed" or "strongly agreed" that preparing for bushfire could reduce damage to the family home (91%), improve living conditions (52%), increase the value of the

property (51%), and improve the family's ability to deal with disruption (75%) following fire. In Hobart in 2006, 92% of respondents "agreed" or "strongly agreed" that preparing would reduce damage, 55% believed it would improve living conditions, 52% believed it would improve the value of the home, and 74% felt preparing would reduce disruption following a fire. These proportions were closely replicated in Hobart in 2007, and were slightly, but consistently lower in Sydney, where respondents reported having significantly lower levels of positive outcome expectancy than Hobart ($F_{2,994}$=4.552, p=0.011). Very few respondents (in all cases less than 2%) "strongly disagreed" with any of the items composing the positive outcome expectancy measure. However, 1 in 10 respondents "disagreed" that preparation could improve living conditions (11%) and that preparing could increase the value of the family home (10%), and these proportions were consistently higher in Sydney than in Hobart.

*4.4.4.5 Sense of community (*people*)*

The sense of community *people* measure was composed of four items that focussed on friendships, loyalty and belonging within the respondent's community. Sixty-eight percent of all respondents "agreed" or "strongly agreed" that they felt like they belonged in their community, 89% believed that their neighbours would help them in an emergency situation, 62% were loyal to the people in the community, and 45% indicated that friends from within the community often visited. Interestingly, 28% of all respondents "disagreed" or "strongly disagreed" with the statement that they often had friends over from the neighbourhood, indicating that more than a quarter of respondents do not have strong friendships within their communities. In Hobart in 2007, when sense of community *people* was found to be the second strongest positive predictor of bushfire preparedness (ß=0.212), the corresponding proportions among respondents was consistent with these results, but with slightly higher proportions of people feeling they belonged to their community (67%), and that other members of their community would help in the case of an emergency (91%).

*4.4.4.6 Sense of community (*place*)*

Sense of community *place* (which is not place attachment *per se* (Low & Altman, 1992), but does contain items that measure sense of belonging to place) only predicted bushfire preparedness in Hobart in 2006. In this case it was the third strongest predictor of

preparedness (ß=0.128), and therefore some elements of place attachment must be important when making the decision to prepare for bushfire. Generally most respondents “agreed” that they would remain in their current communities even if given the opportunity to leave (38%), and planned to stay a resident in the community for some time into the future (49%). Respondents from Tasmania in 2006 reflected these proportions almost exactly, but proportions were somewhat higher in 2007 (40% and 51% respectively). Sydney respondents had a slightly weaker attachment to place with only one third agreeing they would not move even if they had a choice, and slightly less than half agreeing they would remain in the community for some time to come. This suggests there is likely to be a higher turnover of residents in the surveyed Sydney suburbs, and therefore less retention of bushfire information, and decreased likelihood that strong social networks between community members could be maintained or formed (Alesina & La Ferrara, 2000; McMillan & Chavis, 1986; Morrison, 2003).

4.4.4.7 Resources available to assist preparation

The resources measure primarily examined whether respondents felt they had enough information about effective preparation. In general respondents “disagreed” or “strongly disagreed” that information about preparing was hard to find (62%), but almost one third of respondents felt that fire services should provide more information resources to assist preparation. The majority of respondents (68%) believed they knew what resources they needed to prepare, but only half (53%) indicated they already had these resources available to them.

In Hobart in 2006 having the necessary resources available to assist preparation was the strongest positive predictor of bushfire preparedness (ß=0.148). Sixty-one percent of people “disagreed” or “strongly disagreed” that information about preparing was hard to find, and also disagreed that fire services should provide more resources (37%) to assist preparation. Most respondents reported they knew what resources they needed (65%), but again, only half had those resources at hand (51%).

4.4.4.8 Risk perception

While risk perception has been viewed as an important factor influencing hazard preparedness in the past (see for example King, 2001; Lindell & Perry, 1992; Mileti & O'Brien, 1993; Paton*, et al.*, 2000a; Tierney*, et al.*, 2001), its influence was only observed in Hobart ’06 with a relatively weak (ß=0.117) positive role in predicting bushfire preparedness. Overall, respondents “agreed” or “strongly agreed” that bushfire could pose a threat to personal safety (86%), property (95%) and their community (93%), but were less sure that bushfire would interrupt their daily lives (work/leisure, 70%). Respondents felt that their neighbours would think in the same way as themselves in this regard.

In 2006 Hobart residents perceived risk to themselves, their property and their community slightly more than the overall results (89%, 97% and 93% respectively), but were less concerned about disruption to their daily lives (68%). Risk perception did not change between 2006 and 2007 in Hobart, and Sydney respondents had a slightly lower perception of bushfire risk, a significant difference from Hobart ’06 ($F_{2,997}$=4.798, p=0.008).

4.5 Discussion

Although decision-making is an individual and unique process, the results presented here suggest some decision cues are generally influential across those householders who took part in this research. It is therefore likely that while the beliefs, attitudes, emotions and experiences of each individual might be very different and influence each individual uniquely, in the case of bushfire preparedness decision-making these unique characteristics are actually acting on a suite of key decision cues. The cognitive processing that individuals at risk from bushfire go through may consequently revolve around these key factors, whose importance and operation are discussed here.

Utilising a mixed methodology has helped to identify, qualitatively and quantitatively, a suite of four key decision cues that have some empirical influence over the way individuals decide to prepare their homes for bushfire threat. The analyses indicate that outcome expectancy, sense of community, preparation inhibitors and intention to prepare play key roles in the individual’s decision to prepare or not. The results also attest to the complexity of the bushfire

preparedness decision, with the effects of some decision cues mediating (*e.g.* the intention to prepare) or being mediated (*e.g.* outcome expectancy) by other cues. Previous research examining bushfire preparedness has identified that the decision to prepare is a dichotomous one (Paton*, et al.*, 2008a; Paton*, et al.*, 2006a), and this observation is supported by the results presented here. The four key decision cues form the core suite of factors influencing preparedness decision-making.

Based on the results of the qualitative and quantitative analyses, when choosing whether or not to prepare, the cognitive processing of people living at risk of bushfire can be identified as being due to these cues primarily. While these cues may be the most important at the broader cognitive level, how they actually influence preparedness decision-making is necessarily dependent on the householder's beliefs, attitudes, emotions and experiences (characteristics influenced by factors such as perceived bushfire severity, fear, agency trust and salience – see section 4.3), which operate on a finer scale with considerably greater variability between individuals. To assume that outcome expectancy, preparation inhibitors, sense of community and intentions are the *only* cues that influence preparedness would be over-simplistic. However, these four variables give a generalised picture of the decision maker's cognitive process. So, while several variables appear to influence whether or not people decide to prepare, common themes exist between individuals and a few core cues seem to be particularly important.

The following path (structural) model (Figure 4.4), adapted from Paton *et al.* (2008a), describing bushfire preparedness decision-making is proposed. This theory is consistent with the causal relationships between decision cues identified from the qualitative data and provides a model designed to illustrate householder cognitions specifically relating to the bushfire preparedness decision. The figure indicates the two main processes by which decisions to prepare or not prepare are made. Decision-making is initially driven by outcome expectancy, which then influences the two aspects of sense of community (place and people) and the ability of individuals to solve problems collectively. Outcome expectancy also influences the intention to prepare directly, and indirectly through sense of community and collective problem solving. Negative outcome expectancy demonstrates a direct influence on bushfire preparedness, but preparation inhibitors may also negatively mediate such a

relationship. Positive outcome expectancy, sense of community *place* and collective problem solving also exhibit direct and indirect relationships with bushfire preparation. This model describes preparation as an outcome of a series of decisions, where decision cues within the model are dependent on those preceding it.

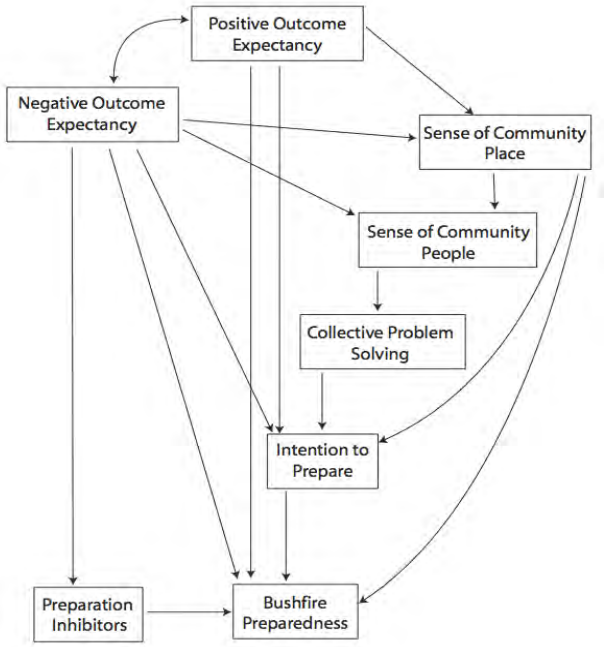

Figure 4.4. Substantive theory (structural model) depicting the hypothesised process by which householders make decisions about bushfire preparedness.

Outcome expectancy appeared to be one of the main cues interviewees first discussed when asked about what factors influenced their bushfire preparedness. Outcome expectancy was expressed in both positive and negative terms, and each was closely associated with one branch of the dichotomous “prepare” or “not prepare” choice that at-risk householders are making. Paton *et al.* (2008a) confirm that the principal drivers of preparing and not preparing are positive and negative outcome expectancy respectively. However, while positive or negative outcome expectancy may drive preparedness directly, it is also clear that these relationships may also be indirect and mediated by relationships with other decision cues. For instance several interviewees were clearly well-prepared and discussed having strong beliefs in the benefits of preparing, but these people also admitted that fear of the bushfire or not having others around (sense of community) to help when bushfire threatened would

determine whether they felt comfortable staying to defend their property. In contrast, individuals who had negative outcome expectancy were less likely to prepare, and discussed not preparing because of preparation inhibitors like the cost and time needed to do so. The effect of outcome expectancy (positive and negative) on preparing may therefore be heavily mediated by other factors in the individual's cognitive processing and this could explain why positive and negative outcome expectancy were not strong quantitative predictors of bushfire preparedness.

The basic condition within the communities surveyed was one where negative outcome expectancy predominated. Even so, many interviewees discussed how their negative perceptions about preparation effectiveness were reversed through experience with bushfire and the positive benefits preparation resulted in, and the development of knowledge about fire and about preparation that came with these experiences. The development of positive outcome expectancy in these cases is extremely important driver of sense of community. Individuals with positive outcome expectancy are more likely to prepare, and also more likely to share their positive thoughts and knowledge with the people living around them. On the other hand, people with negative outcome expectancy don't prepare, and are less likely to engage with the people in their communities about the environmental risks they mutually face (Paton*, et al.*, 2008a). Sense of community consequently acts as a strong mediator between outcome expectancy and preparedness. However, the outcome expectancy-sense of community relationship may also operate in reverse. People without experience of bushfire, who had not observed the benefit of preparing, and therefore lacked an objective reason to believe making preparations around the home could prevent disastrous outcomes in a bushfire are dependent on sense of community to drive the formation of positive outcome expectancy beliefs. This may provide added evidence of the importance of the mediatory role that sense of community plays with negative outcome expectancy in influencing preparedness decision-making.

Sense of community was the second key factor discussed by householders that influenced their preparedness, and a concentration on this theme by interviewees reflects the particular importance of sense of community in the case of bushfire hazard. Most natural hazards require preparedness at the level of the household, and what happens during hazard activity

mostly affects each household individually. By contrast, bushfire threat requires collective preparedness because each household is only as safe as the neighbouring properties (AFAC, 2005; McLeod, 2003; Paton, 2006b) – depending on the distance between them, if two unprepared households either side of a well-prepared property catch fire, then the sandwiched property is more likely to also catch alight regardless of their level of preparation. In locations where there is a strong sense of community and particularly in those areas that are threatened by bushfire reasonably frequently, the corresponding level of collective preparedness is likely to be high. It is in the interests of each member of these at-risk communities to ensure their neighbours are as well-prepared as themselves, so talking about how to prepare and the benefits of preparing are of high importance.

Sense of community was also expressed in two ways, which reflected the interviewees' feelings about the places in which they lived (attachment to place), and the neighbours who lived around them. The relationship between both aspects of sense of community and outcome expectancy was quite marked in the interviews, and extends beyond the examples provided above. Having a positive sense of community based on connections with others in the community can give individuals with positive outcome expectancy, but low self-efficacy the confidence to stay and defend their property because they know other people will be there to help them if needed. Also, if community members actively discuss preparations among themselves, particularly when experienced people share knowledge with inexperienced people, not only is knowledge shared, but the inexperienced develop positive outcome expectancy beliefs and strong self-efficacy. This is particularly true for new residents who are strongly influenced by their neighbours. For these people, bushfire preparation may be new and unknown and they often rely on their neighbours for direction and to determine what is required in order to solve this new problem that is now posed to them (Eng & Parker, 1994; Lion, *et al.*, 2002), especially in uncertain and challenging situations like bushfire.

This leads to the reliance of many people on others – for information, for preparation advice, for preparation assistance. In the case of bushfire, the ability to collectively solve problems associated with preparation is of utmost importance, and was discussed often by interviewees. Where there is a strong positive sense of community, information about preparing is likely to diffuse more easily to new residents (Rogers, 1995). In these cases

knowledge sharing and support translate into confident and connected community members who know they can rely on their neighbours (Prewitt Diaz & Dayal, 2008) when under threat from bushfire.

Relationships at the community level are also important because they help to offset householders' fear and anxiety about bushfire. Fear and anxiety are known to cause individuals to escape or avoid threatening events (Rogers, 1975; Wildavsky & Dake, 1990), thus resulting in behaviour that is counterproductive in terms of encouraging collective preparedness. Individuals who identified that their fear of bushfire (in terms of both physical or psychological threat) would stop them from choosing to prepare and defend their house in the event of bushfire also noted that this would be reduced if friends, neighbours or family were willing to help meet that threat by staying to defend or simply being there for support.

Attachment to place is likely to strengthen community networks of information sharing and mutual support. Low and Altman (1992) suggest that strong attachment to place leads individuals to make larger emotional investments into their communities, and this observation is supported by recent research on bushfire preparedness (Paton*, et al.*, 2008a). Individuals who have little interaction with their neighbours are likely to have stronger friendships outside of their communities, and may be less emotionally attached to the community where they live (Forrest & Kearns, 2001; Morrison, 2003). These cases may occur if individuals are new to an area, transient (or not financially or emotionally "attached" to their homes - renters are a good example of this), or those people living in a bushfire risk community solely for convenience (because it's cheap or close to town or work) and have established social networks outside of their neighbourhood (Forrest & Kearns, 2001), not for the lifestyle that it might afford, and which might led residents to become more significantly attached to their community (Paton, 2006b; Paton*, et al.*, 2006a).

Where sense of community is weak or non-existent, individuals were more likely to be choosing not to prepare. The types of locations where sense of community was low included those that were newly developed or where transience was high, and where little knowledge or experience of bushfire was possessed or had previously been lost. Sense of community may rely on one or two very active and keen individuals in a community who encourage interaction or collective preparedness, and without them knowledge about how, when and why to

prepare are slowly lost. A good example of this occurred in the suburb of Fern Tree at the foot of Mt Wellington in Hobart, where one newly arrived interviewee (see below) described how her preparation had been solely dependent on her knowledgeable and experienced neighbours. Locations in Hobart where sense of community was high also had very active bushfire groups, and these groups were lead by long term, established members of those communities who effectively drove higher preparedness levels among their neighbours – sharing their knowledge, values and attitudes about bushfire and bushfire preparation to foster similar beliefs throughout their community.

> *It was basically a few guys in the street who were really enthusiastic about [preparing for bushfire] and you know are ready to impart knowledge and have a look at our pumps and all that stuff...Um, the street had a street warming party for us, and they just dropped the telephone tree into our place at the beginning of summer and said there's going to be a meeting and you know, just included us in everything...* [So how has the community contributed to your bushfire awareness?]
> *"Well, 100% really, like if it wasn't for them I don't think we would have been nearly as proactive, like we probably wouldn't have done anything about [preparing] you know.*

Interviewees also noted they had witnessed gradual declines in sense of community over time (and corresponding declines in general levels of preparedness), which they believed were linked to the removal of community gathering places like kindergartens, primary schools and volunteer fire brigade stations. These types of meeting places foster community participation and intermixing and are consequently important places where personal relationships are built and strengthened. It is often in such places where a sense of community is nurtured. Individuals living in localities that lack sense of community are not motivated to prepare because they lack strong attachment to place, information about preparing and its benefit are not shared (if possessed by members of the community), they don't have strong friendships or there is no recognition of the community's shared responsibility to prepare.

Sense of community and outcome expectancy were both observed to directly influence bushfire preparedness for the reasons described above. However, both of these factors can also influence the formation of an intention to prepare, which was one of the strongest quantitative predictors of preparedness, and one identified widely throughout the hazard preparedness literature (Bennett & Murphy, 1997; Johnston*, et al.*, 2005; McIvor & Paton, 2007; Paton*, et al.*, 2008a; Paton*, et al.*, 2006a; Paton*, et al.*, 2005). Intention to prepare acts as an important factor mediating the relationship between sense of community/outcome

expectancy and bushfire preparedness. Those interviewees who actually prepared always discussed their intentions to do so during the interview – when they would begin preparing, what they would do, and how they would do it. That individuals consider these pre-preparation aspects was a key step in converting thoughts into actions, and positive outcome expectancy and strong sense of community act as keys to unlock the ability of individuals to cross this threshold. It is presumably much harder to see through a plan of action if the household has made little effort to determine the logistical necessities the plan would require (time, money, assistance, information *etc*). It is also much harder to act on motivations if other members of the community don't, or when there is little faith in the utility of those actions. For these reasons the relationship between intention to prepare and actual preparation was strong and very important.

The benefit of intention formation lies in the fact that during this process, individuals must make objective assessments of how well-prepared they may already be and what it might be like to defend their property against bushfire. They must consider preparations made in previous years and ensure these are still satisfactory (Does the water pump work? Is my alternate water supply full? Does the sprinkler system need checking?), and they must determine what seasonal preparations should be accomplished (Do the trees close to the house need trimming? Are the gutters clear? Do we have protective clothing close at hand?). They must think about when and how these preparations should be made and who should make them. They must also consider what information is available concerning the current bushfire season, and what this might mean for their bushfire planning – if information points to the possibility of a serious bushfire season, do we plan to prepare and stay and defend, or prepare and then plan to leave? Consequently, forming an intention to prepare requires the individual to think pragmatically about future bushfire related requirements and to realise they may be threatened by bushfire, face that threat, but also recognise that there are many things that can be done to mitigate this threat. Sense of community can play a significant role in all these processes, but particularly because of the value community members place on the information they receive from their peers. Having developed an intention to prepare, and considered bushfire threat objectively and with the help of their peers puts at-risk householders in a much better position to convert their intentions into action.

In contemplating how or whether to prepare, individuals will inevitably also consider the operational factors that may impede their motivation and action. A host of factors are likely to play some part in inhibiting preparation, but interviewees consistently discussed several practical obstacles. These are termed preparation inhibitors and include concerns like the perceived cost of preparing, the necessary time commitment, physical ability, knowledge required to prepare, or the need to cooperate with others to make effective preparations. For the most part these preparation inhibitors play a negative role in influencing the decision to prepare, and this is particularly so for individuals with negative outcome expectancy. People who believed bushfire was too destructive for personal preparations to be effective were more likely to attribute their lack of preparation to impediments like the expense or time required to prepare. Interviewees who felt that preparing for bushfire would not improve their safety indicated they would be loathe to make investments of time or money into activities they believed would be of limited value.

The consideration of the role preparation inhibitors play in the preparedness decision process involves a rational cost/benefit analysis. If at-risk residents believe the benefits accrued by preparing are high (positive outcome expectancy), then they are likely to consider the investment in preparing worthwhile, with the benefits outweighing the costs. For this group of householders preparation inhibitors will play no further role in the decision-making process. On the other hand, if the householder believes the benefits of preparing are few, then the rational choice would be not to invest in preparations but rather to put faith in insurance for instance, as an alternative that can mitigate the outcome of bushfire if the worst possibility is realised. For these householders the cost of preparation outweighs the foreseeable benefits.

4.6 Conclusions

These results suggest three important characteristics about the bushfire preparedness decision process. Firstly, while the decision process involved in choosing to prepare may be extremely complex and vary between individuals, there are a suite of important cues that most people consider. Secondly, the process in which these important cues are considered is similar between decision makers. Lastly, the results confirm research (Paton*, et al.*, 2008a;

Paton*, et al.*, 2006a) that suggests choosing to prepare or not are determined through separate decision processes.

These results also confirm research conducted by Paton *et al.* (2005) that showed people subject to risk from natural hazards interpret their risk in relation to the hazardous nature of the environment in which they live. Individuals' interpretations are influenced particularly by their beliefs about the value of preparation, but also by the people living around them, factors that can vary dramatically in social or geographic contexts. Drawing on a mixed methodology has permitted a more robust exploration of socio-cognitive factors that may play a role in individual's interpretation of their risk and how they mitigate that risk. Importantly, these results have identified a key few factors and the inter-relationships between them that can be generalised to a diverse range of people living at risk of bushfire. The theory presented here provides a starting point from which to quantitatively test and validate the bushfire preparation decision process and understand more definitively how individuals interpret their bushfire risk and convert these interpretations into self-protective behaviours that mitigate their risk. Results from the testing of the validity and reliability of the theory presented here are examined in the following chapter.

5. Testing Bushfire Preparedness Decision Theory

5.1 Introduction

From the results presented in *chapters 3* and *4* two particularly important pieces of information about bushfire preparedness have been identified: firstly, that householders known to be living at risk of bushfire are not generally well-prepared; and, secondly, that when considering preparation, householders living at risk of bushfire choose dichotomously – to prepare, or not to prepare. Clearly therefore, householders predominantly choose not to prepare.

This finding contradicts classical decision theory, which suggests that the goal of decision-making is to obtain maximum utility by seeking "pleasure and avoid[ing] pain" (Ward, 1954, p. 382). Bushfire preparedness decision-making provides a good example of why classical theory does not translate well practically. Most people living at risk of bushfire in Australia (certainly in the areas surveyed in this thesis) recognise their risk and the possible consequences should they be threatened by a bushfire. Bushfire risk communication, media reports, vicarious experiences or otherwise all point to the possibility that bushfire can cause loss of property and in the worst case, loss of life. Under classical decision theory, at-risk people *should* be acting on their perception of the risk, these known consequences and the advice of bushfire risk communicators, and avoiding the negative "utility" associated with bushfire – as a result the rational choice should be to prepare.

Classical expected utility theory describes the way an individual would make a fundamentally rational choice (Kahneman & Tversky, 1979; Tversky & Kahneman, 1992; Ward, 1954), but rationality is a construct of the individual. From the point of view of risk communicators for example, the decision-making process employed by most householders living at risk of bushfire would be considered irrational if they chose not to prepare after considering the weight of information supporting the contrary choice. From the point of view of those householders actually living at risk, the reality of the decision-making process is far more complicated than can be represented by classical theory – primarily by the fact that choice is a process of individual operational reasoning (Jones, 1999; Kahneman, 2003), and therefore

the ultimate choice made by the decision maker is dynamic and rational for the individual at the point in time when it is made. Every person holds different beliefs, emotions, attitudes and experiences, which cannot be cast aside in the decision-making process. So while householders may intend to make rational choices, they do not necessarily succeed because their rationality is "bounded" by their "internal make-up" (Jones, 1999, p. 298). The "overt or covert" cognitive processing confounds "rational" choice when individuals make risk-related decisions (Loewenstein, *et al.*, 2001, p. 267).

That individuals make decisions bounded by their own rationality and situational influences poses difficulties for the agencies producing standardised outreach material designed to encourage householders to mitigate the impacts of bushfire. Risk communicators and householders exist together on a rationality continuum, but one that is perceived differently by each. What is perceived to be a rational choice by one player, may not be viewed as favourably through another's sphere of reasoning. The result is likely to be miscommunication, misunderstanding or misinterpretation of outreach programs or risk communication information (Grothmann & Reusswig, 2006; Mulilis, 1998; Paton, 2003, 2006b; Recchia, 1999; Slovic, 1986). As Proudley (2008, p. 42) correctly points out in the case of emergency management, "[the] idea that people should conform to the prescriptions of emergency services is futile."

Risk communicators perceive the information and advice they provide to the public to be rational and warrant rational action. Their outreach materials are derived from the substantial knowledge gained through the experience of their organisations and the information they provide is based primarily on that experience. Which houses are safe? When it's best to leave or stay? What makes a severe bushfire? The material risk communicators produce and distribute is therefore considered (by the communicator) as objectively rational, and risk communicators expect those people who receive their information to follow the advice logically and rationally. In the eyes of the fire-fighter, leaving a defendable house when flames are within view would be considered an irrational choice.

The householder's beliefs concerning rational actions may either reflect or contradict the risk communicator. Many people who receive risk information perceive they live at risk, recognise the logic of the risk communication information is based on and act "rationally". However, a

large proportion of people receiving risk information act quite differently than would be expected by risk communicators. The way these people interpret their situation is directed by their own reasoning about bushfire, which is strongly influenced by their intrinsic state of mind concerning bushfire: Is bushfire good or bad? Can bushfire be controlled or managed? What impact will it have? Is it a threat to my life or lifestyle? A household on the peri-urban fringe of Hobart prepares the property as they see fit, the bushfire arrives but it is far bigger than expected, the preparations are questioned, and the rationality of waiting for a bushfire to "burn over them" is questioned – the members of the household quickly get in their car with the intention to outrun the fire. This is not a hypothetical example. Based on results from *chapter 4*, when asked about the rationality of this choice, many householders are likely to respond that it was a rational one given the situation they were in.

Modelling the cognitive process of preparedness decision-making is the first step in helping risk communicators to develop outreach programs that overcome this disparity between expert judgement and lay-person action concerning bushfire threat. In order to minimise the gap between expert's perceptions of rationality and those of the lay-people who are targeted by risk communication, it is particularly important to understand how householder's reasoning about bushfires might confuse rational and irrational action. This requires the validation and testing of preparedness decision-making theory, and the development of an evidence-based model identifying decision-making cause and effect. In particular, this analysis can identify how variable the decision-making process is within and between communities (of place) at risk of bushfire. Coupled with an identification of the characteristics of communities that influence their ability to use risk communication messages to their benefit should ensure the development of successful bushfire education campaigns.

The structural model describing a hypothesised process of bushfire preparedness decision-making outlined in *chapter 4* (Figure 4.4) gives a generalised description of the socio-cognitive processing at-risk individuals are engaging in. Householders consider these factors covertly, and are influenced by intrinsically individual beliefs, emotions, attitudes and experiences. The model is based primarily on qualitative interview data collected with householders living in the peri-urban fringe of Hobart in 2006, and consequently reflects the factors important in those peoples' decision-making. In order to determine how useful this

theory is in predicting bushfire preparedness empirically in a wider context, the theory must be validated and tested. A key objective of this research is to provide fire services and emergency managers with an evidence-based model that can be used to best manage bushfire outreach programs. In developing an evidence-based model it is necessary to apply the model empirically to explore its potential to explain how individual decisions, and the components within those decisions can influence the choice to prepare or not. The current chapter describes the quantitative assessment of the bushfire preparedness theory described in *chapter 4*.

5.2 Methodology

For a detailed outline of the quantitative data collection techniques used in this thesis refer to *chapter 2*. The collection of quantitative survey data, including development of survey measures, survey distribution, survey response are described in section 2.3. Data cleaning and management are described in section 4.2.4.

5.2.1 Structural Equation Modelling (SEM)

Structural Equation Modelling (SEM) is used here to examine householder decision-making in a bushfire preparedness context. SEM is particularly suited to the confirmation of theory and enables assessment of causal relationships between variables that are based on qualitative assumption and analysis (Anderson & Gerbing, 1988; Byrne, 2001; Goldberger & Duncan, 1973; Nachtigall, Kroehne, Funke, & Steyer, 2003). The benefit of using SEM lies in the ability to estimate multiple dependence relationships simultaneously and to identify how well empirical data fits with a hypothesised theory (Goodness-of-fit). SEM is a multivariate data analysis technique that combines aspects of multiple regression (structural path analysis) and factor analysis (measurement of latent constructs with multiple items) to estimate a series of interrelated dependence relationships (Kline, 2005). While the ability to examine the role of latent constructs in multivariate analysis is a key advantage of SEM, only observed variables are examined here using a structural path analysis. SEM is used here because it can test theory as a whole, rather than by looking at individual causal relationships. Bollen (1989),

Byrne (2001) and Kline (2005) provide detailed descriptions of SEM and its application in the social sciences.

In the current study, causal relationships between variables have been determined from in-depth analysis of qualitative interview data (*chapter 4*). SEM is applied here using a confirmatory path analysis method (using only observed variables) to test these causal relationships, and ultimately to determine how well the hypothesised theory predicts bushfire preparedness (by assessing model-fit to empirically collected data). The specification of a structural equation model was based on variables that corresponded to those described in the hypothesised theory (Figure 4.4). Confirmation of this theory is carried out here using a two-step process with three large data sets collected over time and in different locations. The first step involves validating the theory: Does a theory developed from qualitative data collected from at-risk householders display a strong goodness-of-fit to quantitative data collected from the same householder population? The second step requires the validated model to be re-tested with data from the same locations at a different point in time, and from a different location. Using this two-step method provides an extremely robust means by which to test the suitability of the proposed bushfire theory in a variety of situations. Quantitative data used to validate and re-test the theory were collected in two peri-urban locations. In Hobart, data were collected in October 2006 (N=482) and 2007 (N=349) creating a longitudinal data set. In Sydney, data were collected during October and November 2007 (N=221).

The null hypothesis tested in all SEM analyses states that the data collected fits the proposed model of bushfire preparedness (Chi-square). This method provides an absolute test of goodness of fit (with non-significance indicating a strong model fit). However, because SEM analyses are sensitive to effects of sample size and non-normality, other goodness of fit indices can also be examined when a significant Chi-square result is returned (on which basis the null hypothesis would normally be rejected). Where appropriate, subjective indices of fit can be considered if the Chi-square test returns a significant result. Alternative indices reported when appropriate include the Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Normed Fit Index (NFI), Global Fit Index (GFI), and Global Fit Index adjusted to degrees of freedom (AGFI). Descriptions of these fit indices are provided by Long and Perkins (2003) and Byrne (2001).

In order to conduct SEM analyses, data were checked to ensure it met several statistical assumptions. Firstly, SEM requires a relatively large number of cases per variable to provide reliable results. Bentler and Chou (1987) recommend 15 cases per measured variable as a minimum. The model tested here has eight measured variables, meaning 120 cases would be the minimum required to gain accurate parameter estimates (particularly standard error). The smallest data set used in the current chapter allowed 27 cases for each measured variable, with the largest set allowing 60. SEM demands complete data sets and missing value analysis and replacement was conducted prior to undertaking SEM (see section 2.3.4.1), which prevented the necessity of using the AMOS software's inbuilt maximum likelihood technique for missing data replacement, which imposes some restrictions on the analyses and interpretation of results. SEM also requires continuous and normally distributed data, and while the data used here were not strictly continuous (because data were collected using Likert scales), the underlying distributions of the scales used is continuous. Data were found to be normally distributed. Lastly, the model specified in the SEM analysis was over-identified (where more than one possible solution to each parameter estimate exists, but where each has only one best or optimal solution determined during exhaustive qualitative analyses during the theory development), and is explicitly based on substantive qualitative data, which ensures a strong theoretical basis for determining the causal relationships. All SEM analyses were conducted using AMOS version 17.

5.2.1.1 Structural model validation

Data collected from Hobart in October 2006 were used to validate the proposed bushfire preparedness theory. In validating this substantive theory, having a quantitative data set that corresponds directly to the qualitative set is extremely important as it acts as a control against which validation can be conducted. Because both sets of data have been collected from the same population of at-risk householders, quantitative validation of the qualitative theory provides a means by which to cross-examine that theory. It was anticipated that the Hobart 2006 quantitative data analysed using SEM would provide a strong fit to the substantive theory and offer confirmation for this theory.

5.2.1.2 Testing the structural model

Once confirmed, two secondary data sets were used to test the ability of the confirmed theory to predict bushfire preparedness under different conditions (time and location). Testing the model in this way allows an experimental assessment of how well the model could be applied to predict bushfire preparedness under conditions removed from those in which the model was initially developed. Testing was conducted using two new data sets. The first was collected in the same locations in Hobart as the initial validation data set, but during the following bushfire season (October 2007 - with the inclusion of several additional suburbs to the original Hobart sample). This data set permitted a longitudinal test of the theory and enables more solid conclusions to be drawn about the process leading to bushfire preparedness, overcoming the constraints imposed by cross-sectional examinations of decision-making for bushfire preparedness (Paton*, et al.*, 2008a). In addition, secondary testing was conducted with data collected from householders living in peri-urban locations around Sydney. To be considered strong, the proposed theory should also reflect the decision process followed by individuals living in different environmental and social conditions, and with different bushfire regimes.

5.3 Results

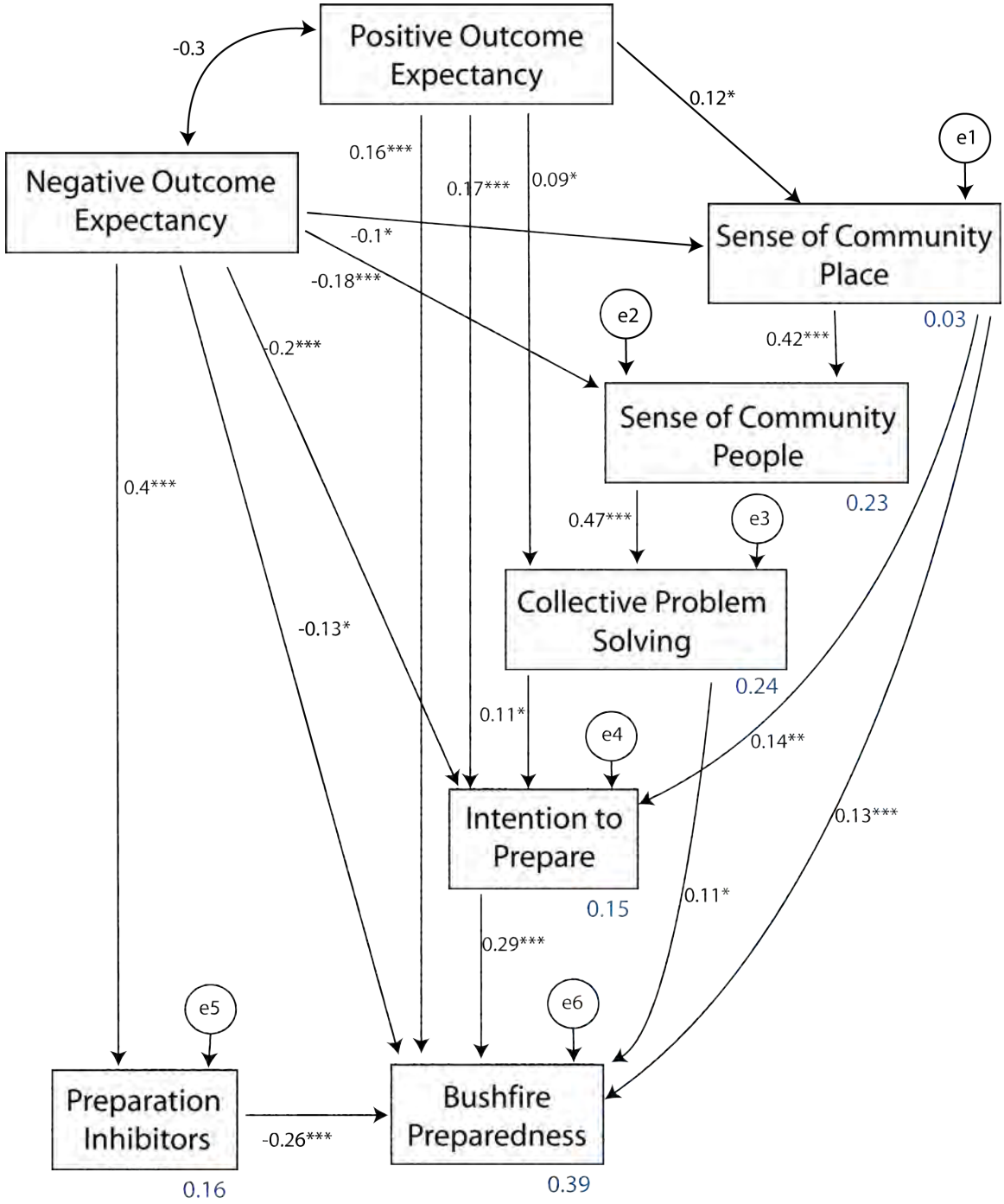

Figure 5.1. Bushfire decision-making measurement model - Validation of structural model of bushfire preparedness decision-making against data collected from Hobart householders in 2006 (χ^2=8.519, df=10, p=0.578; RMSEA=0.001, 90% 0.000 → 0.044). Showing R^2 value (blue) and standardised regression weights (black). *=significant at 0.05, **=significant at 0.01, *=significant at 0.001.

5.3.1 Structural Model Validation

Results from the SEM analysis to validate the theory of bushfire preparedness are detailed in Figure 5.1. Using data collected from peri-urban residents in Hobart, the model is able to predict 39% of the variance in householders' preparation, which is considered a very good effect size based on comparisons to similar socio-cognitive models (Sheeran, 2002). The model described strongly validates the hypothesised theory of bushfire preparedness as identified in the analysis. The model fit indices (χ^2=8.519, df=10, p=0.578; RMSEA=0.001, 90% 0.000 → 0.044) and P Value for test of close fit (RMSEA < 0.05) = 0.976; CFI= 1.000, NFI = 0.988, GFI =0.995, AGFI = 0.984) indicate that the proposed model fits the data extremely well. The non-significant result in the Chi-square test suggests that the null hypothesis, that the proposed model fits the data collected in Hobart in 2006, should be accepted. A table of showing estimates of regression weights and illustrating the significant and non-significant paths in this, and all following SEM models is provided in Appendix F.

5.3.2 Structural Model Testing

Testing the validated model with data collected from Hobart residents in 2007 provided additional support for the hypothesised bushfire preparedness theory, and is detailed in Figure 5.2. A similar level of variance (32%) in Hobart residents' bushfire preparedness was again predicted by the model. The data fit the model slightly less well (χ^2=17.450, df=10, p=0.065; RMSEA=0.046, 90% 0.000 → 0.082), but again the null hypothesis, that the proposed model fits the data collected from Hobart in 2007, was accepted (P Value for test of close fit (RMSEA < 0.05) = 0.520). This action is supported by the alternative model fit indices that confirm the model is a good fit to the data (CFI= 0.985, NFI = 0.966).

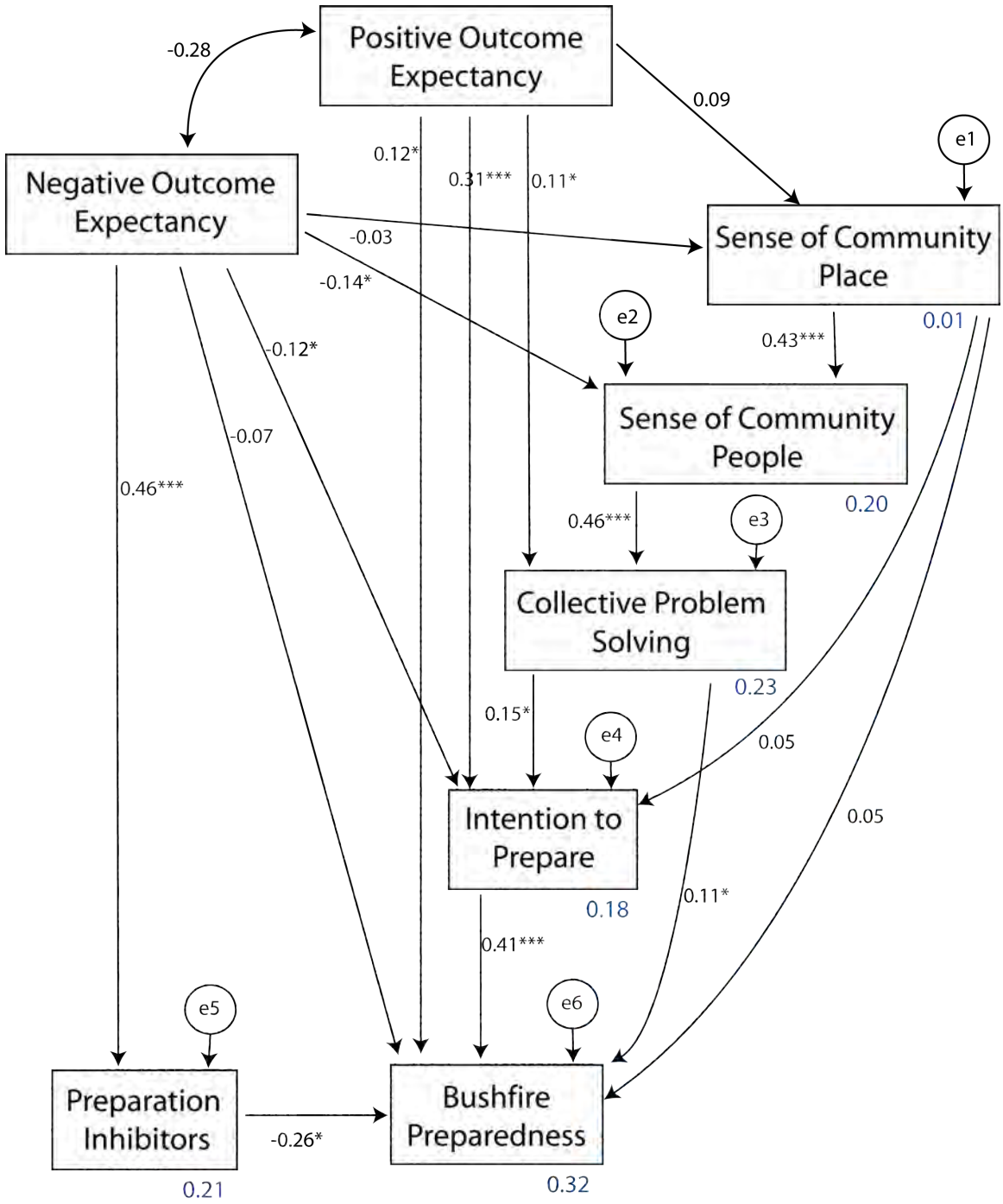

Figure 5.2. Measurement model of bushfire preparedness decision-making against data collected in Hobart 2007 (χ^2=17.450, df=10, p=0.065; RMSEA=0.046, 90% 0.000 → 0.082). Showing R^2 value (blue) and standardised regression weights (black). *=significant at 0.05, **=significant at 0.01, *=significant at 0.001.

When testing the model against data collected from NSW in 2007 a slightly different story emerged. The theoretical model of bushfire preparedness decision-making fits data collected in Sydney (Figure 5.3) more poorly (χ^2=35.982, df=10, p<0.001; RMSEA=0.109, CFI=0.913) than data collected from the greater Hobart area. The model predicts only 24% of the variability in Sydney residents' preparedness decision-making.

While the same number of surveys (1500) were distributed in peri-urban areas of Sydney in 2007, the response rate was substantially lower (18.5% from Sydney as compared to 30.7% from Hobart in the same year). Surveys in Sydney were distributed by representatives from the NSWFB's Community Fire Guard in each community, and in order to increase the response rate from Sydney, these individuals were contacted. While not recorded, these individuals suggested anecdotally that the low response rates might be the result of low levels of sense of community, which may explain why there was little interest in bushfire preparedness and therefore a low response rate to the survey. However, survey data does not suggest that sense of community, particularly the "place" component of sense of community was consistently lower in the Sydney sample. This finding may be explained by differences in reasons for living in a fringe area between Sydney and Hobart residents. Anecdotal accounts from residents from Sydney that emerged following the recent fires points to the fact that people in peri-urban locations live there for financial (*i.e.* cheaper) rather than lifestyle reasons. If these accounts are accurate, they may explain why "place" is less important in the Sydney sample. Results from the Sydney surveys do indicate that while these householders are attached to the places where they lived (often pointing out that they would not move from their suburb if they had the opportunity), their feelings of belonging to the community were not as strong as in Hobart. Consistent with these results, the modification indices direct the removal of the Sense of community "people" variable from the structural equation model. This results in a slight improvement in the fit of the model with the Sydney data (χ^2=14.531, df=3, p<0.002; RMSEA=0.132, 90% 0.069 → 0.204; and P Value for test of close fit (RMSEA < 0.05) = 0.018; CFI= 0.945, NFI = 0.936, GFI = 0.979 AGFI = 0.854), which is represented in Figure 5.4.

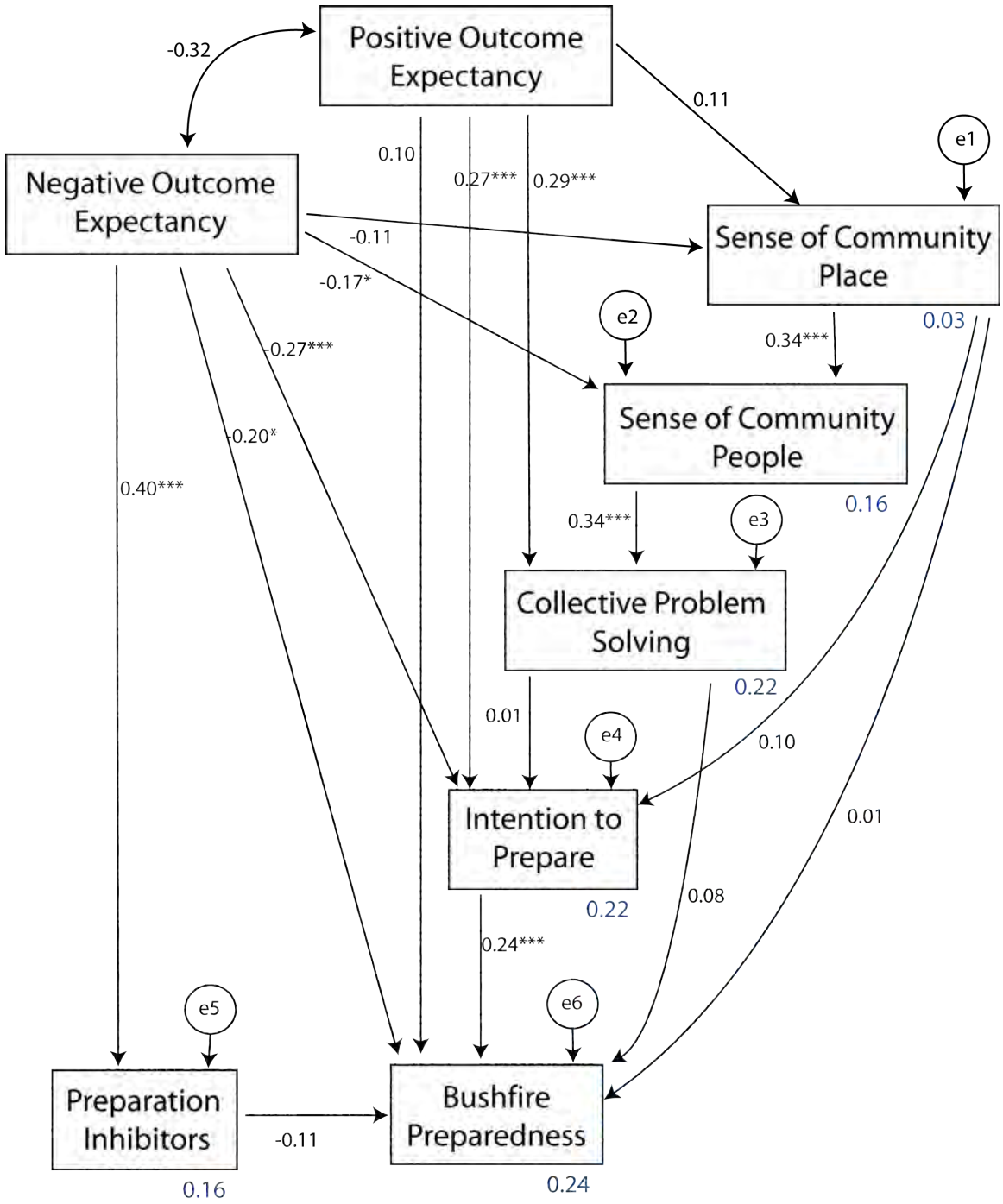

Figure 5.3. Measurement model of bushfire preparedness decision-making against data collected from Sydney in 2007 (χ^2=35.982, df=10, p<0.001; RMSEA=0.109, CFI=0.913). Showing R^2 value (blue) and standardised regression weights (black). *=significant at 0.05, **=significant at 0.01, *=significant at 0.001.

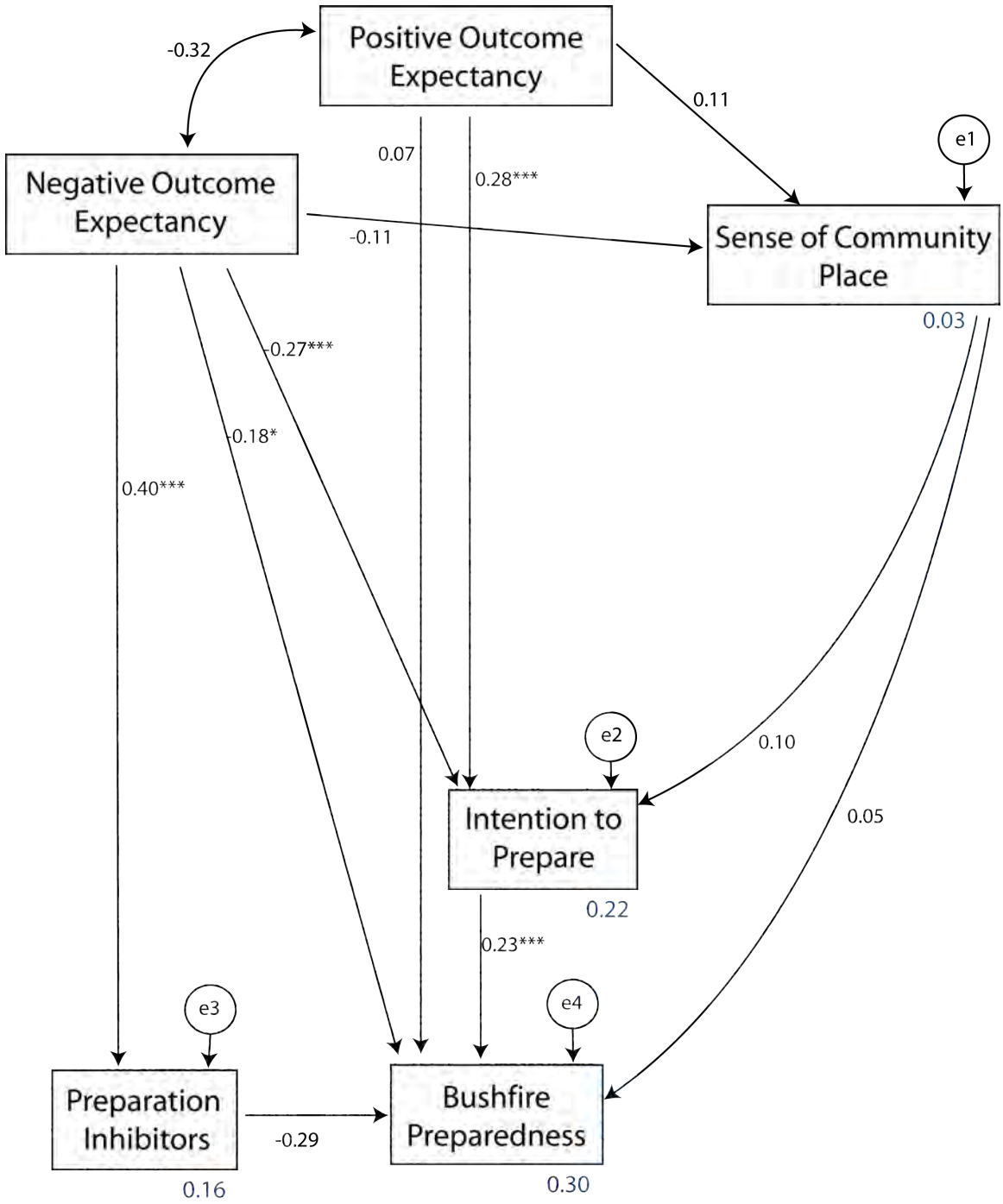

Figure 5.4. Removal of sense of community "people" and collective problem solving when modelling data collected from Sydney results in a slight improvement in the model fit (χ^2=14.531, df=3, p<0.002; RMSEA=0.132, 90% 0.069 → 0.204). Showing R^2 value (blue) and standardised regression weights (black). *=significant at 0.05, **=significant at 0.01, *=significant at 0.001.

The importance of community variability can be observed using a comparison of model fit to data collected from suburbs in Hobart in 2006 and 2007. Differences in the model fit may confirm the dynamic nature of the bushfire preparedness decision-making process.

5.3 Discussion

Three findings from these results are particularly important in understanding bushfire preparedness decision-making, and for the development of risk communication programs that encourage greater levels of community bushfire preparedness. Firstly, the results confirm work conducted by Paton *et al.* (2008a) and Paton, Kelly, Bürgelt and Doherty (2006a), which identifies that bushfire preparedness decision-making involves process that increase the likelihood of preparing and others that reduce the likelihood of people preparing. Secondly, differences in the fit of the current model to the three data sets suggests variations exist in community decision-making (bushfire preparedness reasoning) between years and between locations. This is consistent with research describing social heterogeneity in locational communities or "communities of place" (Alesina & La Ferrara, 2000), the social construction of risk (Cottrell, 2005; Cottrell*, et al.*, 2008; Dake, 1992; Tierney, 1999) and differences in individual reasoning (Finucane, *et al.*, 2000; Jones, 1999; Kahneman, 2003; Simon, 1955; Tversky & Kahneman, 1974). Lastly, although community differences in decision-making inhibit a good generalised model fit across the available data sets, several of the decision cues in the model hold constant and form a strong foundation from which the model may be varied to suit different communities. The results presented here confirm that modelling preparedness decision-making can yield important insights into community reasoning about bushfire preparedness.

The confirmation that either choosing to prepare or not prepare are the results of discrete decision processes (Paton*, et al.*, 2008a) suggests that with targeted education non-preparation behaviour may be addressed. These discrete processes are driven initially by people's perceptions about the likelihood that bushfire preparations can improve the chance of defending their homes – *i.e.* is their bushfire preparedness outcome expectancy negative or positive? Both manifestations of the householder's outcome expectancy play direct roles in

influencing the intention to prepare and actual bushfire preparation, and these relationships can also be mediated by other important decision cues.

The decision not to prepare (or at least, factors that reduce the likelihood of preparing) is primarily driven by negative outcome expectancy beliefs about undertaking bushfire preparations. In all modelling (Hobart and Sydney in 2006 and 2007), negative outcome expectancy showed a direct negative influence on the formation of intentions to prepare (and more weakly on bushfire preparation). This indicates that people with negative outcome expectancy (*e.g.*, that believe that hazard consequences are too catastrophic for personal actions to affect safety) are unlikely to form preparation intentions. This is an example of "bounded" rational reasoning by householders with little confidence in bushfire preparations.

Although expert sources of information attest to the benefit of and safety inherent in preparing to mitigate a potential threat, householders do not necessarily believe this information if they lack experience that can place the information in context and give it meaning (Barnett & Breakwell, 2001; Breakwell, 2000; Caballero*, et al.*, 2003; Grothmann & Reusswig, 2006; Halpern-Felsher*, et al.*, 2001; Jacobson*, et al.*, 2001; Paton*, et al.*, 2001a; Proudley, 2008; Weinstein, 1989), if the proposed actions are not supported by significant others (Carroll*, et al.*, 2005; Gordon, 2004; McIvor & Paton, 2007; Paton*, et al.*, 2008a; Prewitt Diaz & Dayal, 2008; Proudley, 2008), or if the individual feels they lack the capacity (mental or physical) to undertake protective behaviours during threatening situations (Bennett & Murphy, 1997; Bishop*, et al.*, 2000; Duval & Mulilis, 1999; Lindell & Whitney, 2000; Paton*, et al.*, 2005). But even these factors don't necessarily increase the likelihood that an individual uses risk information as it is intended, and this is particularly true in the case of experience (Lin, Shaw, & Ho, 2008; Paton*, et al.*, 2008c), and if people reason that their ability to mitigate a threat (*e.g.* from bushfire) is out of their control (Bright & Manfredo, 1995; Carver, 1997; McClure, *et al.*, 1999; Sheeran, *et al.*, 2002). Combining this information with results from the previous chapters that identified there were more people choosing not to prepare, suggests that current bushfire risk communication information is not generating confidence in preparedness behaviours. Future risk communication campaigns should address this deficiency by directly targeting this lack of confidence.

The relationship between negative outcome expectancy and bushfire preparation is strengthened when mediated by preparation inhibitors (the cost of preparing, time needed to prepare, knowledge needed to prepare, need to seek help from others to prepare *etc*, described in Paton *et al.*, 2008a). Inhibitors to preparation are often invoked by those householders who believe preparing cannot increase their chances of surviving bushfire threat, and who search for plausible reasons why they cannot or should not prepare. While these reasons may be all too real for some at-risk householders (and must therefore be considered in risk communication activities), for others, preparation inhibitors are a construct that allows them to pass up undertaking actions they are uncomfortable with, or simply don't have confidence in. People living in bushfire risk areas are generally aware of bushfire threat, they receive bushfire risk communication information that points to their duty to prepare, but if they have no confidence in preparations it is likely that they won't undertake these protective behaviours. Because the social desirability of bushfire preparation in at-risk communities is often high, when people lack confidence in the ability of preparations to provide protection, relying on factors like preparations inhibitors can be a powerful mechanism to justify not preparing when their neighbours are.

Positive outcome expectancy, or a belief that personal and property preparations can increase the likelihood the home may be successfully defended when bushfire threatens, plays a significant positive role in promoting the householder's choice to prepare. While positive outcome expectancy directly influences both intentions to prepare and bushfire preparations, again the strength of the relationship between positive outcome expectancy and intention is consistently the stronger of the two. This reflects the important role that confidence in protective behaviours plays in the process of forming intentions to prepare for natural hazards (Paton*, et al.*, 2008c).

The relationship between positive outcome expectancy and bushfire preparedness was (like negative outcome expectancy) most strong when mediated by other decision cues. In particular, this relationship was mediated by social factors including sense of community (place and people) and collective problem solving (*i.e.* the ability to interact with other members of the community to solve problems). Paton *et al.* (2008a; 2008c) suggest that while some individuals are capable of translating their positive outcome expectancy into

preparedness action on their own, others require more information, or assistance from their neighbours to do so effectively.

However, this mediation between positive outcome expectancy and intention, and the consequent bolstering of householder preparation, only seems to play a role in communities where strong social connections exist. In Sydney, where anecdotal interview information and survey data suggest the communities are less socially interactive than in the Hobart locations surveyed (and from which qualitative data were used to develop the initial model of preparedness decision-making), the mediating role of sense of community *people* and community problem solving are less influential and/or less well developed. In Sydney, positive outcome expectancy still influences intentions and bushfire preparations directly because some individuals do not need social ties to help them to prepare, but without the mediating effects of sense of community and collective problem solving, the ability of the model to predict householder preparation is concomitantly lower. There may also be other decision cues (for example self-efficacy, agency trust, or considerations about staying or going if bushfire threatens) mediating this relationship, which were not modelled in the present research, but whose influence was identified while discussing preparation with some of the interviewees.

These findings highlight a fundamental imperative that must be confronted when modelling decision-making, and when developing risk communication/education campaigns designed to encourage bushfire preparedness: that inherent variability between at-risk communities must be accounted for to ensure satisfactory outcomes. Model validation carried out here was able to support the theory of bushfire preparedness proposed in *chapter 4*, which was based on qualitative data collected from Hobart. However, the failure of quantitative data collected from Sydney localities to fit the same model indicates different factors may be at play in the preparedness decision-making process of these householders (*e.g.*, influenced by the relative contributions of lifestyle versus socioeconomic influences on housing location choice). Profiling communities to identify characteristics, capacities and bushfire preparedness knowledge through direct contact in the lead-up to bushfire season, or the development of bushfire preparedness education campaigns is imperative (Cottrell, 2008). Direct engagement of emergency managers with the community may also enable the identification of this

variability and aid the development of community-specific education campaigns (Paton & Wright, 2008), so developing a model specifically to represent the Sydney data would have been useful.

A substantial body of literature points to the inherent variability that exists between different communities (see for example Bell & Newby, 1974; Dalton, *et al.*, 2001; Forrest & Kearns, 2001; Keane, 1991; Putnam, 2000; Völker, *et al.*, 2007), and even between different communities with seemingly similar social, political, environmental and economic influences and characteristics (Flora, 1998). There is also extensive evidence that community variability poses a significant challenge for researchers and emergency managers in the case of bushfire preparedness and mitigation (Carroll, *et al.*, 2005; Cottrell, 2005; Cottrell, *et al.*, 2008; Goodman & Gawen, 2008; Jakes, 2002; Nelson, *et al.*, 2004; Prior & Paton, 2008; Proudley, 2008; Steelman & Kunkel, 2004). This variability may be explained by the fact that while "communities of place" (Alesina & La Ferrara, 2000; Flora, 1998; Low & Altman, 1992) may exist in the same general localities, the people who compose these communities are often quite heterogeneous in attitudes, emotions, beliefs and experiences.

Sense of community *people* may operate as a mediator in bushfire preparedness in the Sydney and Hobart samples in different ways for several reasons. Alesina and La Ferrara (2000) point out that communities of place that exhibit higher levels of heterogeneity (in culture, age, experience *etc*) engage in less intra-community interaction, and the development of social capital (from which a sense of community generally develops) is subsequently impeded. Hobart is a small regional city with a relatively stable population that is homogeneous in nature. In contrast, Sydney is a "gateway city" (Ley & Murphy, 2001), continually attracting new residents from diverse cultures. Many of these new residents settle in peri-urban locations because the housing is less expensive, yet the residents are still within commuting distance to workplaces in the city. Others are relocating from suburban areas closer to the city centre, seeking lifestyle or "tree-change" alternatives to high density city living. Such diversity leads directly to heterogeneity in attitudes and beliefs about all aspects of the environment (Alesina & La Ferrara, 2000).

A greater role for sense of community in Hobart residents' decision-making may be attributed to the recency of bushfire affecting Hobart suburbs during the research period. Fires in Mt.

Nelson, Hobart (October, 2006) coincided with survey data collection there (though data were not collected from this area directly), while fires adjacent to Howrah and Lindisfarne (December, 2006) shortly preceded the qualitative interviews. Portes (1998) notes that people who find they share a common fate make investments in the development of social capital (Prewitt Diaz & Dayal, 2008), and as part of this process tend to establish "reciprocity transactions" (Simmel & Wolff, 1964) that see them generating obligations between each other that are nonetheless based on self interest. The fires around Hobart in 2006 may have drawn the communities closer together than they would typically have been, as the residents recognised fire as a possible threat to their lifestyles at that time. This may be directly relevant in the case of bushfire, where sense of community allows individuals to become mutually reliant on information, assistance and moral support when preparing in the lead up to bushfire season, and thus generating a quantum of community preparedness (Paton, 2006b).

These ideas also closely align with the concept of threat availability (Keller, *et al.*, 2006; Siegrist & Gutscher, 2006; Tversky & Kahneman, 1974), which posits that recent, highly frequent or easily recalled threats are likely to be considered more salient. The fact that no bushfires occurred in or near the Sydney region during the surveys (T. Kirkpatrick, pers. comm., 08.05.08) may have meant that people were not drawn together with shared concern about bushfire threat. It is then possible that the mediation role that sense of community people plays in the decision-making process was not activated in the Sydney sample. In Hobart in 2007 the model testing revealed a weaker mediation role for sense of community, and this may reflect a decrease in the availability of bushfire threat in a year when there were no significant bushfires close to Hobart.

High turnover of residents in the community may also reduce social cohesion and sense of community. Survey results from this research support the contention that Sydney respondents had a slightly weaker attachment to place and possibly higher resident turnover, with only one third of householders agreeing they would not move even if they had a choice, and slightly less than half agreeing they would remain in the community for some time to come (see section 4.4.4.6). Also, anecdotal discussions with Community Fire Guard (NSWFB, 2007) representatives from several of the Sydney suburbs surveyed in this study pointed to high resident turnover as a possible factor that may be contributing to the

diminution of sense of community *people* within their neighbourhoods. Morrison (2003, p. 119) suggests that high turnover of residents within a neighbourhood leads to a decline in social capital where social "[n]etworks disrupt and weaken, population turnover erodes familiarity and trust, [and] the community disengages…". Forrest and Kearns (2001, p. 2130) go on to point out that social networks are the "building blocks of social cohesion—through [which] we learn tolerance, co-operation and acquire a sense of social order and belonging." It is also possible that people in Sydney are "'buy[ing] into neighbourhoods as physical environments rather than necessarily anticipat[ing] or practice[ing] a great degree of local social interaction" (Forrest & Kearns, 2001, p. 2130). If indeed there is greater turnover of residents in the Sydney localities sampled, or people are simply not interested in forming relationships with their neighbours, then this may partly explain why sense of community *people* and collective problem solving were not important components of the preparedness decision process in these areas.

Lastly, community variability can be attributed to the fact that communities are composed of individuals. Each person thinks about the hazardous environment in which they live in a different way and this is partly determined by the other members of the community (Brenkert-Smith*, et al.*, 2006; Carroll*, et al.*, 2005; Cottrell*, et al.*, 2008; Tierney, 1999), but also by the characteristics of their environment (Hodgson, 2007), their different beliefs (Sjöberg, 1979, 2007), attitudes (Tedeschi & Lindskold, 1976) or experiences (Grothmann & Reusswig, 2006; Keller, *et al.*, 2006). Affect also plays a key role in a person's interaction with their environment and strongly influences how they think about and act on risks and threats (Finucane, 2008; Finucane, *et al.*, 2000; Loewenstein, *et al.*, 2001). The diversity in personality types, demographics, needs, goals, expectations *etc* that comprise the average community of place is naturally huge and as a result of a confluence of all these influences, it is likely that each person within a community will hold a different capacity to construct an idea of risk from natural hazards like bushfire (Lupton & Tulloch, 2002).

These influences also lead people to develop imperfect "perceptions and understandings of social and natural systems" (Hodgson, 2007, p. 233), which differ from those of the expert (Breakwell, 2000; Fischhoff, *et al.*, 1982; Powell, *et al.*, 2007; Sheeran, *et al.*, 2002; Siegrist & Gutscher, 2006). If people think differently about where and how they live, this will certainly

affect the decisions they make. Mismatches between expert advice and layperson action may be described using the concept of bounded rationality (Jones, 1999; Kahneman, 2003; Simon, 1955). Jones (1999) suggests that any decision arises from two sources. The first is the external environment and concerns the way we "respond to the incentives facing us" (*e.g.* the benefit that comes from bushfire preparedness, also termed "expected utility" in classical decision theory). "The other is the internal environment - those parts of our internal make-ups that cause us to deviate from the demands of the external environment" (Jones, 1999, p. 298). In this example the expert is able to advocate (and appreciate) a decision that reflects the demands of the environment because their knowledge, understanding and experience permits it. The layperson's rational response is tainted by their imperfect perceptions or understanding of the environment or situation, and by their "internal make-ups". Individuals should therefore be expected to make different decisions from one another, decisions which sometimes contradict the advice of risk communicators and educators. Slovic (1999, p. 689) neatly identifies that "[t]he public is not irrational. Their judgments about risk are influenced by emotion and affect in a way that is both simple and sophisticated."

5.4 Conclusion

Overall, variability in the fit of data when testing the theoretical model of bushfire preparedness suggests that, like in the case of a standardised risk communication processes, generalising an hypothetical decision process is counter-productive. Decision-making is a dynamic process within the individual as well as between individuals and between communities. In order to best understand the way people are making decisions about bushfire preparedness, it is necessary to allow for flexibility in the process by considering the social and environmental contexts or situational characteristics in which the decisions are being made. Likewise, to most effectively communicate about risk the community must be engaged in that process, allowing for the idiosyncratic nature of communities to be appreciated and incorporated in risk communication activities (Gilbert, 2007; King, 2008; Miller, Summerville, Buys, & Bell, 2008; Paton*, et al.*, 2008a; Paton*, et al.*, 2008c; Paton & Wright, 2008; Prior & Paton, 2008).

Differing community contexts also influence the effectiveness of those variables used to describe the bushfire preparedness decision process. Variability between communities,

particularly in aspects like sense of community, self-efficacy, knowledge about bushfire, experience of bushfire and bushfire salience *etc*, determine to a large extent how people respond to some of the constructs in the survey. For example, where sense of community is strong, and people share information about bushfires readily, they may be more attuned to recognise the benefits (like forming an intention to prepare) that sense of community gives them. If people do respond to these constructs in different ways because of their particular circumstances, then different results in the quantitative data become evident, and the data becomes less reliable as a result. As a consequence of these community-specific inconsistencies in measurement it is necessary to retain or exclude variables even if those decisions may not be supported by previous analyses. Self-efficacy provides a good example: while the qualitative data suggested self-efficacy was an important step in the decision process, variability in the response to the quantitative survey confused this variable, and it was consequently excluded from the modelling analyses reported in this chapter. It was found that the collective problem solving variable was able to explain aspects of self-efficacy (see chapter 4), and while not found to be an important qualitative predictor of preparedness, was nonetheless demonstrated to play a significant role in the preparedness decision process.

Having established the challenges for modelling preparedness posed by the inherent variability between communities, the modelling conducted in this chapter did reveal a root process that was common in Hobart and Sydney, and which could advise the development of future bushfire risk communication campaigns. This process identifies outcome expectancy as a key point of origin, which can influence bushfire preparedness directly or indirectly. Indirect relationships involve mediation by preparation inhibitors (negative outcome expectancy) to reduce the likelihood of preparation, and sense of community *place* and preparation intentions (positive outcome expectancy) to increase the likelihood of preparation. These mediating factors strengthen the relationship between outcome expectancy and bushfire preparation, as well as the predictive capacity of the model.

Building confidence in bushfire preparation (combating negative outcome expectancy and generating positive outcome expectancy) must be a key objective in future bushfire preparedness education campaigns. The results presented in *chapters 4* and *5* indicate firstly that people generally are choosing not to prepare, and that this decision is driven primarily by

a lack of confidence in the advocated preparations. Building positive outcome expectancy, and in particular targeting the (community specific) mediators that help individuals to convert their confidence into action is imperative. Using community engagement techniques (Paton, *et al.*, 2008a; Paton & Wright, 2008; Prior & Paton, 2008) will certainly improve the chances of gaining successful outcomes.

To develop future bushfire risk campaigns, a basic understanding of preparedness decision-making must be augmented by direct information gathering and sharing with targeted communities. This can enable emergency managers to identify and address specific variability between those communities (for mechanisms that might assist in this regard, see Cottrell, 2008 who describes "community profiling" as a means to determine the risk communication requirements of a community), for instance by also targeting mediatory factors in the decision-making process (whether they be sense of community, collective problem solving, preparation inhibitors or otherwise). Coupled with an understanding of individual reasoning about bushfire preparedness, community engagement can also help us to identify where and why mismatches between expert judgement and layperson action arise. While useful in conceptualising this mismatch or misinterpretation of information, the concept of bounded rationality is a scientific construct that does not exist for the householder – their decisions are rational purely because they are made within the constraints of their socio-environmental/socio-cognitive position. Emergency managers may disagree with some of those decisions, but an engagement process that assists agency personnel (building their knowledge and capacity) to appreciate why those decisions may be contrary to their own beliefs will be an important community-empowering mechanism.

What *is* important is the ability to use mechanisms like decision modelling and community profiling (through engagement) to better align bushfire risk education campaigns with the rationality of the targeted population. If homeowners living at risk of bushfire are not preparing, our goal must be to change their behaviour. To do this we must share information that helps them to make better decisions about their lifestyles in the context of their environment and the hazards they face. Standardising decision modelling or risk communication processes relies on the assumption that the decision maker's reasoning will be static and that they would consider only the beneficial outcomes of the choice. Clearly this

is not the case, and while taking a more flexible approach in both cases complicates already complex processes, the outcomes are likely to be more successful.

In order to accommodate and better understand much of the variability influencing the bushfire preparedness decision-making process, it is important to critically revisit the initial theory developed in *chapter 4. Chapter 6* progresses the initial theory by introducing several new cues to propose a more complex, but more comprehensive model of bushfire preparedness decision-making that can be tested in the future.

6. Progressing Bushfire Preparedness Theory

6.1 Introduction

The theory of bushfire preparedness decision-making proposed in *chapter 4* and tested in *chapter 5* builds on research conducted by Paton, Kelly, Bürgelt and Doherty (2006a) and Paton, Bürgelt and Prior (2008a). To strengthen the evidence-based nature of the previous models, the current theory development has examined decision-making using both cross-sectional and longitudinal techniques, as well as an examination of the model against data collected in socially and environmentally diverse locations. This work has drawn heavily on qualitative analyses, and focuses primarily on those decision cues identified to be important from that data.

This work has also focussed on producing a model that can be used by fire and other agencies with responsibility for developing and disseminating bushfire risk communication messages to increase the effectiveness of their education campaigns. To do this, qualitative and quantitative data were triangulated to identify the most important decision cues believed to be contributing to the preparedness decision. In so doing, several decision cues identified in the analyses were excluded from the modelling process either because they were cited as important factors in decision-making by only one or two interviewees (*e.g.* self-efficacy, agency trust), or because it was difficult to determine from the interviews the exact operation of a cue (*e.g.* bushfire severity, environmental characteristics and bushfire weather). Finding a way to incorporate these excluded decision cues in the modelling process requires a progression of the theory that has been identified and tested in the preceding chapters.

Results from *chapter 5* indicate that in retrospect, the exclusion of these decision cues may handicap the modelling process and provide less assistance to emergency managers than initially intended. As identified in the previous chapter, the preparedness decision process is a very complicated and variable one, and its oversimplification is likely to inhibit a good description of the way householders may actually be deciding to prepare. In particular, the exclusion of some socio-environmental and institutional decision cues identified in the qualitative analyses (including bushfire salience, weather and environmental conditions,

perceptions of bushfire severity, agency trust, and the influence of the choice to stay or go) are likely to play important roles in the preparedness decision-making of householders living at risk of bushfire.

The strengths and weaknesses of the proposed model have been identified during its validation and testing. The model fits cross-sectional and longitudinal data collected in the same location very well. However, when tested using data collected from locations other than those where the qualitative data used to build the theory were collected, the model fit with the data decreases. This suggests that with the modelling carried out here we are able to make some useful conclusions about bushfire preparedness decision-making, but particularly in Hobart localities where qualitative data can be directly connected with quantitative data. In this sense also, we have been able to capture some of the community variability that may be complicating the model fit to data collected from Sydney localities where no qualitative data were collected. Without that qualitative data to elicit a deeper knowledge of what is occurring in Sydney, and which differs from Hobart, we are unable to anticipate specific individual and community level idiosyncrasies, and these may significantly impact on the way Sydney participants are making bushfire preparedness decisions (refer back to section 2.1.4 for an outline of some of the notable differences in community at these two sampling locations).

Also, the heterogeneity (for example in culture, reasons for living in the peri-urban environment, social networks within or outside of the place of residence *etc*) of the people inhabiting the surveyed communities may pose problems when including decision cues designed to capture interactions between individuals living in these (or other) communities. For instance, the results presented in *chapter 5* suggest that while most people form an attachment to the places in which they live, this does not necessarily extend to the formation of emotional bonds between the members of the communities (as suggested by Low & Altman, 1992). This is especially the case in peri-urban areas of large cities like Sydney where community heterogeneity is particularly high (Ley & Murphy, 2001; Trewin, 2006), where neighbourhood resident turnover may be higher leading to reductions in social cohesion (Forrest & Kearns, 2001; Morrison, 2003; Trewin, 2006), and where community members have not been drawn together by shared fates (Portes, 1998; Prewitt Diaz & Dayal, 2008), like recent bushfire for example, that would engender knowledge sharing and a

commitment to the bushfire safety of self and others. Even when found to be important (in Hobart samples particularly) not all individuals rely on strong interactions with other members of their community to help them make sense of preparations or to act on the information provided to them by risk communicators (Paton*, et al.*, 2008a). This is particularly the case for householders who are uncertain about bushfire, its behaviour or effects, and look to other members of the community to help clarify their situation and the problem posed to them by bushfire risk. Consequently, removing decision cues like sense of community *people* and collective problem solving from the theory may result in a better general predictive ability for the model. Householders' choices about living in an area for economic *versus* lifestyle reasons can qualify this position: those who chose to live in the peri-urban area for solely economic reasons are likely to have less contact with others (Forrest & Kearns, 2001; Graffy & Booth, 2008; Morrison, 2003), this will reduce the chance that this characteristic of low social cohesion will be picked up by measures designed to tap into normal community life activities and interaction. As found in *chapter 5*, such factors may be important in one area, but with differences in community characteristics, their importance may vary dramatically.

The current chapter presents a progression of the theory presented in previous chapters. While this theory incorporates components of the original theory tested in this thesis, it also assimilates the results of the research to propose a more generally descriptive model of bushfire preparedness decision-making.

6.2 A Discussion of Future Modelling Direction

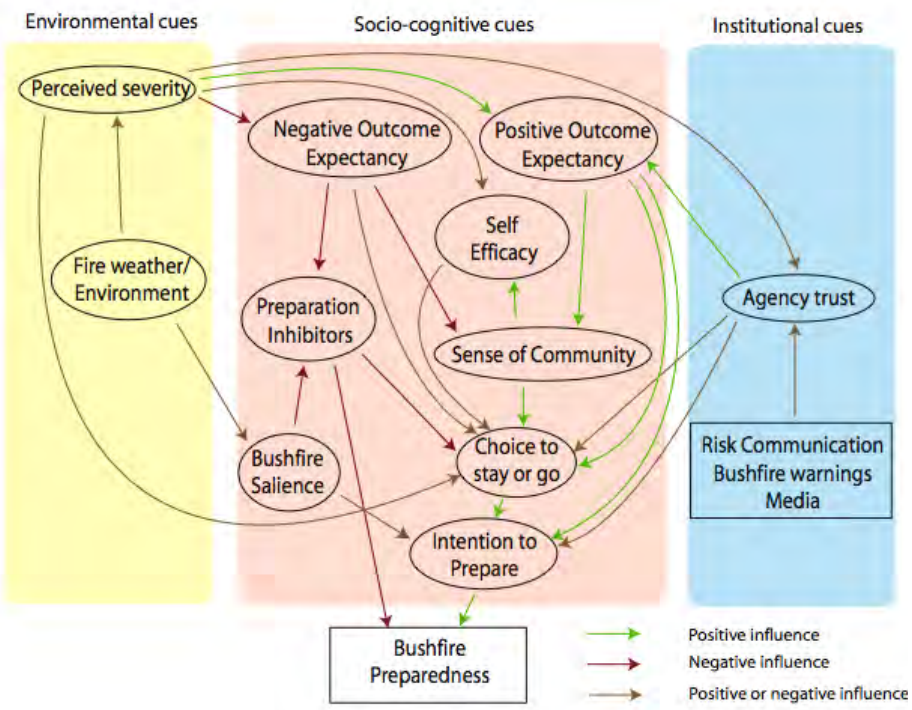

Figure 6.1. Revised theory of bushfire preparedness explicity identifying socio-cognitve, environmental and institutional cues in preparedness decision-making. Coloured arrows indicate positive and/or negative influence.

Figure 6.1 outlines a revised bushfire preparedness decision theory that builds on the model tested in the preceding chapters, but also includes important cues that were previously excluded from the modelling analyses. While more complicated than the original model, by drawing on the findings of both quantitative and qualitative analyses, it allows for a more comprehensive way of conceptualising the way householders living at risk from bushfire make decisions about preparing their homes. Householders who responded to the current bushfire study have already made decisions about whether or not they should prepare for bushfire, and can therefore be considered to exist at the end of the decision process outlined above (which essentially represents the current point in time). In order to best describe how they have reached the point where they make a choice between preparing or not preparing it is necessary to work back through this process.

The following provides a description of the process depicted in Figure 6.1, focussing particularly on links between the decision cues, with special attention given to those cues not included in the original theory proposed in *chapter 4* (the choice to defend or leave early, bushfire salience, perception of bushfire severity, agency trust, environmental conditions and bushfire weather, and self-efficacy).

6.2.1 Intention to Prepare

Intention to prepare acts as the primary positive predictor of bushfire preparedness, and along with outcome expectancy, sense of community and preparation inhibitors forms the core of this progressed theory. While some householders are likely to convert positive outcome expectancy directly into preparation, for the most part householders' bushfire preparations are made following the formation of preparation intentions. This is consistent with previous research exploring the natural hazard preparedness decision process (Johnston*, et al.*, 2005; McIvor & Paton, 2007; Paton*, et al.*, 2008a; Paton*, et al.*, 2008b; Paton*, et al.*, 2006a; Paton*, et al.*, 2000a, 2005).

While a good indication of the likelihood that an individual will adopt protective behaviours, intentions are not always converted into actions. One key limitation on the conversion of intention into action is the individual or household's planning skills. The Health Action Process Approach Model identifies two distinct stages in health behaviour change: firstly in the development of intention (where risk perception, outcome expectancy and elements of self-efficacy play a role), and secondly, following intention development, when volitional barriers or resources prevent or ensure behaviour change (Lippke, Wiedermann, Ziegelmann, Reuter, & Schwarzer, 2009; Lippke & Ziegelmann, 2008; Schwarzer, 2008; Wiedemann, Schüz, Sniehotta, Scholz, & Schwarzer, 2009). Schwarzer (2008) indicates that after developing a "good intention", this inclination must be converted into action, which requires particular planning skills and knowledge – without which, the behaviour is unlikely to be performed. Paton (2005) had earlier identified this stage-based process in successful preparation for natural hazards, but also notes that risk compensation biases like the transfer of responsibility from householders onto emergency services (for example Ballantyne*, et al.*, 2000; Paton*, et al.*, 2000a) and a low sense of community may also ultimately affect the translation of

intention to action. This issue may explain why many householders are more likely to adopt "soft" over "hard" bushfire preparations – the former can be undertaken with little specific bushfire thinking, but the latter require more thought, knowledge or different motivations (*e.g.* positive outcome expectancy, sense of community or self-efficacy) to be successfully completed.

In this model intention to prepare is influenced by four cues: the householder's choice to stay and defend the house or leave, bushfire salience (discussed in detail in section 6.2.2), trust in bushfire management agencies (agency trust), and positive outcome expectancy. The influence of the choice to stay or leave the house if bushfire threatens is perhaps the most important new finding from the results obtained from this research. While the revised model designates the stay or leave choice as a mediating factor, it is better to consider this choice as a "decision node" – a highly important point within the whole decision-making process, which is influenced by many decision cues, and that has a polar influence on preparation intention (either encouraging or dissuading the formation of preparation intentions). Understanding why this decision node plays such an important role in the preparation decision calls for a re-think of the predictors that influence the choice to stay or leave. Further research of a socio-psychological nature that examines this choice specifically could inform the development of an effective stay or go message from a risk communication perspective. Such research is now critical given the discussion that has arisen regarding the validity of the "prepare, stay and defend or leave early" message following the devastating Victorian bushfires of February, 2009.

Householders who have made the choice to stay and defend their property will almost certainly have, in making that choice, formed an intention to prepare. These individuals may connect their ability to defend, and their ultimate safety to the preparations they make in the lead-up to the bushfire season. Preparing then becomes a core objective that helps them to realise their choice. By contrast, householders choosing to leave the property are less likely to form preparation intentions. As identified in *chapter 4*, a large proportion of householders in the study were adopting a "wait and see" approach to the choice to stay and defend or leave that was largely dependent on their perceptions of bushfire severity. It is considerably more

difficult to be motivated and develop preparation intentions if no definite choice has been made on the household's course of action if/when bushfire threatens.

Bushfire salience also influences intention quite strongly. Householders who are familiar with the threat of bushfire, who acknowledge they are at risk from bushfire and act on this precept, or who exhibit a proactive approach when facing problems in their daily lives are more likely to consider bushfire threat as salient. However, the seasonality of bushfire threat, which begets a certain familiarity with this natural hazard (somewhere in Australia is affected by bushfire in every bushfire season), coupled with perceptions concerning the minimal likelihood that fire may actually present "in my backyard" in any one season, acts to reduce bushfire salience for most people. Seasonality of bushfire threat, and the often dire predictions that agencies provide in conjunction with the beginning of each bushfire season ultimately act to reduce salience, particularly when these predictions are not realised or cannot be verified by householders. Qualitative results from this research suggest that most people consider other issues in their lives more pressing than bushfire. Householders are more likely to address those issues they do consider salient before they act on bushfire threat, which will certainly impact on their propensity to develop bushfire preparation intentions.

Agency trust has been included in this revised model to acknowledge the huge weight of evidence pointing to trust, and agency trust in particular, as important factors influencing hazard preparation and the understanding and acceptance of risk communication information (Paton, 2007b, 2008b; Paton*, et al.*, 2008b; Siegrist & Cvetkovich, 2000; Sjöberg, 1999; Slovic, 1993; Van Swol & Sniezek, 2005). Paton (2008b) notes that as information about natural hazards, their consequences and the appropriate mitigation actions become less available (*i.e.* the ease by which relevant instances come to mind: see Tversky & Kahneman, 1973) the public has to rely more on information provision from emergency management agencies, and must trust that information implicitly – the development of that trust will influence whether the information is used to make decisions. This information can be an important tool agencies can use to motivate people to prepare by eliciting the formation of preparatory intentions. However, in the case of bushfire where availability is higher than in other natural hazards due to seasonal frequency, householders can feel inundated by

bushfire alerts and warnings. If the veracity of these warnings are not demonstrated, trust can be lost quickly (consider the fate of the much-maligned weatherman, who's forecasts are continually wrong). Under such circumstances people may not form preparation intentions because of a kind of "cry wolf" effect. This issue was also identified during interviews carried out with individuals affected by a severe fire on the east coast of Tasmania (Prior & Paton, 2008). Even though many householders received very little warning from fire agency personnel (and were reliant on these warnings as a cue to enact their bushfire response plans), interviewees noted that several of their neighbours overlooked the urgency of these already late warnings (because of warnings given in previous years that were observed to be unnecessary) and only acted when they could see the bushfire bearing down on them (requiring a last minute response).

Finally, positive outcome expectancy has a positive influence on preparation intentions. Householders who believe preparing can result in beneficial outcomes if bushfire threatens are demonstrably more likely to develop strong intentions to prepare. Positive outcome expectancy is akin to confidence, and with confidence comes the ability to face the unexpected. When individuals are able to trust the hazard mitigation information they are provided with, their confidence builds, as does their intention, and consequently their preparation. The relationship between positive outcome expectancy and intentions is discussed more fully in section 4.3.5.

6.2.2 Bushfire salience

Based on the qualitative analyses described above, bushfire salience is primarily influenced by householders' considerations about the weather and environmental conditions around their properties. It can thus change on a daily basis. Specifically attending to the problems this can generate will be important. Many interviewees (32 of 36) discussed weather conditions (hot, dry, windy), reflected on forest or woodland characteristics (dry, lots of vegetation and leaf litter, vegetation types), and indicated that these cues increased their concern about bushfire. Many people living in peri-urban areas around Hobart described themselves as being aware of the environmental conditions that are associated with changing levels of bushfire risk. However, in many cases the increase in salience did not necessarily correspond to an

increase in bushfire preparedness because of the limited timeframe this practice permits for adequate preparations to be made.

Seasonal bushfire warnings issued by fire service agencies are a key tool these agencies use to increase bushfire salience. The findings reported in this thesis suggest that this technique has limited effectiveness. As noted above, in order for householders to act on these warnings, they must believe they are accurate. In relation to bushfire salience, this is not so much an issue of agency trust, but one of previous experience. Receiving warnings, which are made inaccurate by the lack of bushfire activity during the bushfire season, eventually cause people to develop a non-susceptibility to those warnings. While their interest in bushfire may be piqued briefly following the warning, the warning does not elicit the kind of reaction the bushfire agency may be seeking. Seasonal bushfire warnings prior to the true commencement of the bushfire season can therefore be counter-productive. On the other hand, Prior and Paton (2008) identified that householders under direct threat from bushfire were relying on warnings (albeit of a different kind, which concerned the imminent approach of bushfire) as their cue to prepare, consequently finding themselves in precarious positions when the fire front reached their properties before any formal warning was issued.

6.2.3 Choosing to stay and defend or leave early

For many householders in this study the intention to prepare for bushfire was closely linked to the decision to stay and defend their property or to leave. The choice to stay or go seems dependent on many cues, but for householders this choice presents a clear imperative: to stay and defend means making preparations, to leave means that preparing is unnecessary. It is important to note that recent events in Victoria in February 2009 have highlighted a need to identify the preparatory actions and beliefs required to leave. Not all people make the choice to stay or go first, and as the model identifies, the stay/go decision emerges as a result of other previous or concurrent cognitions (outcome expectancy, self-efficacy, trust and preparation inhibition, bushfire severity and possibly even bushfire weather and environmental considerations). The choice to stay or go may be a key factor in the dichotomous choice between preparing and not preparing identified by Paton *et al.* (2006a)

and Paton *et al.* (2008a) and corroborated by results from *chapter 5* and discussed already in section 6.2.1.

The choice to stay or go is one that most people made based ultimately on their own assessments of how severe a potential bushfire might be. With regard to staying or going, perception of severity was considered in light of the interviewees self-efficacy, outcome expectancy, and from information derived from other members in the community. This information was used to construct an idea about the safety of each option. People with high self-efficacy, positive outcome expectancy, and good (positive) support from the community, which reinforced their feelings about preparation were more likely to regard staying to defend as a safe option (and are consequently more receptive to the risk communication messages that identify remaining in the house as the safest course of action if bushfire threatens). However, the stay or go decision is also strongly influenced by their confidence and trust in the content of those risk communication messages. For instance, many interviewees did not believe that the advice of fire authorities to remain in the house while a fire front passed over was actually the safest course of action (the terminology used here – "to be burned over" may contribute to fear of staying to defend, and ultimately to the householders' lack of trust in such advice).

The perception of bushfire severity influences people's choices about staying to defend their property or leaving. Importantly, the perception of bushfire severity by no means results in a static stay or go choice because the decision is contingent on the prevailing environmental conditions, which themselves are extremely changeable. Considerations of the current weather or environmental conditions may exacerbate the householder's perception of severity and affect the stay or go decision at the last minute (Prior & Paton, 2008; Tibbits & Whittaker, 2007). For people who thought the severity might be low and had consequently resolved to stay and defend, if weather or environmental conditions look particularly bushfire prone (indicative of a "bad" bushfire), then these people are likely to revise their decision at the last minute, placing themselves in a dangerous situation. The influence of perceived severity on the likelihood of householders undertaking protective behaviours closely parallels research in health psychology examining the "health belief model" (Abraham, *et al.*, 1998; Rosenstock, 1974), and is discussed further in section 6.2.10.

The stay or go decision is also strongly influenced by the householder's confidence in the efficacy of preparations as a means of enhancing safety (outcome expectancy) and beliefs in their own abilities to stay and defend (self-efficacy). For instance, low levels of householders' confidence in fire authorities' risk messages about staying in the house may stem from the fact that they were not sure that the preparations that should be undertaken to support such a course of action would actually allow it. For example, many people only had second-hand experience of bushfire, and were reliant on the more experienced members of their community (or even less reliable, risk communication information) to relate the value of preparing, who could point out the ways that different preparations around the house would make it a safe place during bushfire threat. However, this did not allay the fears of the inexperienced that a severe bushfire might mean their house – even with effective preparations – would remain a safe place. Their lack of confidence may also be driven by concern that under the direct threat from a bushfire they would become scared and incapable of seeing their stay and defend course of action through.

> *…probably if it was looking really serious we'd just evacuate. If it was a case of embers falling down and that sort of stuff, then we'd probably stay and deal with it. But if it sort of came to the point where, you know, a major fire front was approaching, or was likely to come to our house, we'd just evacuate.*
>
> *the stumbling block for me is psychological, not physical, not lack of preparedness…*
>
> *I couldn't deal with a fire and would go as soon as I heard about one. There's not much you can do in a big fire.*

The community relationships that were captured by the sense of community data could provide a context in which the information or support that people require to convert outcome expectancy beliefs and concerns about self-efficacy into a confident approach to making the choice to stay and defend. One of the key findings from the results of this research (see sections 4.3.2 and 4.5) suggests that most householders use other people in their communities as a resource to build their self confidence and confidence in preparations, particularly when the other members of the community have experienced bushfire directly and can reflect on those experiences. While sense of community may not be important in all circumstances as a predictor of intention to prepare and bushfire preparedness (as demonstrated in *chapter 5*), it has been well demonstrated that social norms, social networks and social capital do influence the behaviour of individuals (Alesina & La Ferrara, 2000; Flora, 1998; Forrest & Kearns, 2001; Lindell & Perry, 2000; McIvor & Paton, 2007; Portes, 1998;

Putnam, 2000). In the case of bushfire threat these social processes are likely to be acting on the choice to stay or go, which then influences the individual's preparation intentions and actual preparations.

6.2.4 Preparation inhibitors

Preparation inhibitors (as described in Paton*, et al.*, 2008a) designate the key mediating decision cue (between negative outcome expectancy and preparation) that influences the choice not to prepare. While it is clear that for some householders inhibitors to preparation are very real, others tend to rely on preparation inhibitors as an excuse not to prepare. For the latter group, these tendencies are cued by negative outcome expectancy and low bushfire salience, which act as mechanisms that reinforce their choice not to prepare and add credence to issues such as the excessive cost, time or skill required to actually prepare.

The weight of information (and often community sentiment) points towards preparation as an important bushfire mitigation mechanism. However, if people lack confidence in preparations or feel that bushfire is not a salient threat in their lives they are less likely to make the effort to prepare. Forrest and Kearns (2001) point out that if individuals hold attitudes different from others in their neighbourhood, they may become ostracised and isolated. Also, in communities where preparing for bushfire is common, and where community preparedness is highly valued, there may be social expectations (Park, 2000; Smith & Terry, 2003) attached to undertaking preparatory behaviours in the lead up to the bushfire season. These cases pose difficulties for people with low outcome expectancy or low bushfire salience. Arguing that preparing is expensive, time consuming or too difficult may enable non-preparers to avoid ostracism and give their neighbours sufficient reason why they cannot or should not prepare.

6.2.5 Sense of community

As discussed in *chapter 5*, the role played by sense of community in the decision to prepare for bushfires is variable and dependent on the different characteristics of each community (culture, ethnicity, reasons for living at the peri-urban fringe *etc*). Based on the findings from this thesis, a sense of belonging or emotional attachment to people (sense of community *people*) is particularly variable, and its inclusion in modelling bushfire preparedness decision-making is therefore a somewhat questionable endeavour. However, there is a considerable

weight of evidence that points to the contributions of social networks, social cohesion, and social capital, to an overall sense of community (see for examples Alesina & La Ferrara, 2000; Flora, 1998; Forrest & Kearns, 2001; Morrison, 2003; Portes, 1998; Putnam, 2000). Alesina and La Ferrara (2000) point out that sense of community is generated through participation in community activities, which is boosted by phenomena such as trust and human capital, but degraded by the heterogeneity of the community. Flora's {, 1998 #419) research supports this assertion, noting in addition that neighbourhoods with high levels of "social infrastructure" (like establishing groups within the community to deal with collective issues, *e.g.* implementing a bushfire telephone tree that allows members of the community to alert one another about possible bushfire threat) are more likely to work together in the social and economic development of their communities. Morrison (2003) suggest sense of community is diminished by social exclusion, which is determined in a large part by neighbourhood characteristics like housing tenure, cultural identity and resident turnover, and subsequently reduces the level of individual commitment to the community. These components of sense of community (social networks, cohesion, and capital) can be discerned from the definition provided by McMillan and Chavis (1986, p. 9) identifying that "sense of community is a feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together".

So, while variability (of community members in culture, reasons for living in the peri-urban fringe *etc*) poses a problem for the inclusion of sense of community in the model, its contribution is nevertheless important, and qualitative results from this research point to the role sense of community plays as a mediating factor between outcome expectancy (both positive and negative) and bushfire preparation – even if this is not fully corroborated in quantitative modelling. In particular, sense of community can help some householders with positive outcome expectancy to translate these feelings into action (Paton*, et al.*, 2008a). Sense of community may also provide the extra boost that people with negative outcome expectancy need to find out more about preparations and how others feel about their effectiveness, which may serve to build their confidence in such protective behaviours.

6.2.6 Agency Trust

For the implementation of successful risk communication or education campaigns, a trusting audience is critical (McIvor & Paton, 2007; Paton, 2007b, 2008b; Prior & Paton, 2008; Siegrist & Cvetkovich, 2000; Van Swol & Sniezek, 2005; Winter & Fried, 2000). Two key issues have been identified in the current research that affect householders' trust in bushfire management agencies. Firstly, trust can be affected by confusion between messages from different players in the bushfire management community, and in the current research differences between messages received from professional and volunteer fire personnel were particularly informative. Secondly, trust in bushfire management agencies was shown to be affected if householder perceptions about bushfire likelihood did not correspond to agency warnings, particularly when seasonal bushfire warnings were perceived by community members as being consistently inaccurate.

Many interviewees indicated that during their preparations they sought assistance from local volunteer fire brigade members, being members of the communities themselves and therefore easily available and approachable. Householders were primarily seeking advice on what preparations they should concentrate their efforts. In several cases these householders were told that in the event of a bushfire, the volunteer services would be there to protect them. Others were informed that it was unnecessary to store water for the same reason. These messages are at odds with messages provided by the professional fire brigade in Hobart (in the *Prepare to Survive* DVD and information package) and fostered confusion among residents who were thinking about their bushfire preparations. Householders with little or no bushfire experience grasp onto this information from the volunteers because the volunteers are local, known and therefore assumed to be trustworthy. The volunteers are in effect encouraging these householders to transfer the responsibility of preparing onto the fire services, again contrary to the professional fire services and current bushfire risk communication policy (AFAC, 2005). Similar issues were observed by Ballantyne and associates (Ballantyne, *et al.*, 2000) when they examined volcanic and earthquake hazard awareness and preparedness. By contrast, householders who have experienced bushfire know that even the professional fire services have limited resources to deal with severe bushfires, and that such assertions by the volunteer services are false and misleading. For

the experienced and inexperienced householders the actions of the volunteer fire service personnel influenced trust: experienced householders indicated these actions decreased their trust, while less experienced householders placed greater trust and exaggerated reliance on fire services when thinking about bushfire preparation.

As identified in section 6.2.1, agency trust can be eroded when repeated bushfire alerts or warnings are not perceived to be accurate by the recipients. This is particularly problematic when householder perceptions of fire weather and environmental conditions, and therefore their beliefs about possible bushfire likelihood, do not match with fire services. A key role of bushfire managers at the beginning of the bushfire season is an estimation of bushfire likelihood using meteorological, environmental and geographic information. These predictions are aimed at increasing bushfire salience and bushfire preparation. However, because these predictions are made annually, and because they can never be completely accurate for every recipient (not all people receiving these warnings will be affected by bushfire, though some might), householders can become ambivalent to them. As a result, trust in bushfire agencies is eroded over time when the veracity of repeated seasonal warnings can not be confirmed by those receiving them.

6.2.7 Self-efficacy

Householders' considerations of their own abilities and capacities are formative cues that influence the choice to stay and defend or leave the house if bushfire threatens. In the case of bushfire, self-efficacy can be considered in both mental and physical contexts. Results from the present research suggest that people's self-efficacy may be detrimentally affected by fear or anxiety about bushfire, which may handicap them when bushfire threatens whether they are well-prepared or not. Many householders also indicated that their ability to defend their property would depend on receiving help from others, either because they were not physically fit enough, or because they would feel more comfortable if they could share the burden with neighbours, friends or family. In most cases self-efficacy was closely tied to householders' beliefs about bushfire severity – small manageable fires would present little difficulty, severe fires would be viewed more hesitantly.

The connection between perceived bushfire severity and self-efficacy is consistent with the finding that many householders are taking a “wait and see” approach to bushfire preparation. Even well-prepared interviewees with knowledge of bushfire attack and confidence in their preparations, suggested that if a severe bushfire were to threaten them they may consider their personal capacities inadequate to cope. A similar pattern was commonly observed among older or physically infirm interviewees. Many of the interviewees (including the old and infirm) had indicated having made minimal preparations, which corresponded to their lower self-efficacy beliefs: why make extensive preparations for a severe bushfire, when you know that if presented by this circumstance you would choose to leave the property?

For householders with low self-efficacy, other members of the community, friends or family become an important resource upon which considerable reliance is placed. In communities where there are strong social networks, where individuals participate and invest in the life of their neighbourhoods, the members are more likely to help each other in times of stress (Prewitt Diaz & Dayal, 2008). This can relieve a considerable amount of pressure from householders with low self-efficacy, but who recognise their role in ensuring a collaborative response to bushfire threat.

6.2.8 Positive outcome expectancy

Positive outcome expectancy is the key cue driving householders’ decisions to prepare in the dichotomous choice between preparing and not preparing. As a fundamental starting point in the decision to prepare, householders must have some confidence that the preparations they undertake will improve their chances if threatened by bushfire. From the point of view of the householder, it is logical and rational to undertake protective behaviours when those behaviours elicit beneficial outcomes for the household. Two cues were observed to influence householders’ confidence in preparing: trust in the bushfire risk communication messages from fire service agencies, and perceptions about the likely severity of bushfire.

Public trust is an essential resource for all risk communicators (Lee*, et al.*, 2005; Miller*, et al.*, 2008; Paton, 2007b, 2008b; Phillips, 2006; Siegrist & Cvetkovich, 2000; Slovic, 1993, 1999; Van Swol & Sniezek, 2005). Householders who do not trust preparedness information distributed by bushfire management agencies are unlikely to value that information or regard

it as helpful, and will consequently not choose to engage in the proposed activities. Also, distrusted information sources are unlikely to engender confidence in the actions they advocate. In the current research, this may be partly attributed to the fact that in many cases householders place different values on their environment than bushfire managers (Paton*, et al.*, 2006a), and Siegrist and Cvetkovich (2000) identify that without shared values the public places less trust in expert advice. Paton (2008b) suggests that trust is connected to the availability of information about a hazard (Tversky & Kahneman, 1973). The public is more trusting of expert advice if availability is low, but do not need to rely on expert sources when availability is high. Bushfire could be considered a high availability hazard because it is seasonal and reports of bushfire activity punctuate the media every Australian summer. Under these circumstances householders are more likely to develop their own ideas about bushfire risk and mitigation, which may not necessarily reflect the advice or values of bushfire managers. For instance, many interviewees were not confident that the advice of fire authorities to remain in the house while a fire front passed over was actually the safest course of action.

The seasonal frequency of bushfire also allows at-risk householders to develop their own perceptions about bushfire severity. Once formed, these perceptions strongly influence confidence in preparations, the choice to stay and defend or leave, and ultimately the level of preparation householders undertake. Householders who perceive the severity of a bushfire to be low are likely to have greater confidence in their preparations (whether significant or minimal), but if they consider bushfire severity to be severe, their confidence may decrease. For minimally prepared householders, such a decline in confidence may mean they alter their choice about staying or leaving, and possibly at the last minute. For well-prepared householders, thoughts about increased severity may cause concern, but won't automatically change their course of action – especially if they have previous (positive) experience of severe bushfire, or are surrounded by community members who are mutually supportive.

6.2.9 Negative outcome expectancy

Negative outcome expectancy is the key belief driving the choice not to prepare. In contrast to the relationship between positive outcome expectancy and preparedness, people with

negative outcome expectancy, are logically not going to place confidence in preparedness actions. Simply, if householders feel that preparing can make little difference when bushfire threatens, they are unlikely spend the time, money or effort to do so.

Negative outcome expectancy is influenced by the householder's perception of bushfire severity. Where future bushfires are perceived to be severe, outcome expectancy decreases dramatically. Outcome expectancy (both negative and positive) is indirectly influenced by knowledge of bushfire related weather and environmental conditions, which largely determine how severe householders perceive a bushfire will be. Householders consider bushfire risk to be lower in seasons following severe bushfires (the gambler's fallacy) suggesting their outcome expectancy may turn to the positive following such hazard activity. As Paton and associates (2006a) identify, this clearly shows that householders are making preparedness decisions based on their relationship with the environment, and how that relationship is constructed. This also suggests that while the danger of bushfire may be real, the risk from bushfire is socially constructed by the householder, and it is the latter that individuals act on when deciding to prepare for bushfire (Cottrell, 2005, 2008).

6.2.10 Perceived bushfire severity

While householders living in bushfire risk areas may not always prepare, they are not immune to the vast quantity and diversity of information and advice that directs otherwise, and which influence cognitions about bushfire and bushfire preparation simply through passive diffusion. Householders use much of this information to formulate ideas about the severity of bushfire they are likely to face. However, the best indicator influencing the perception of bushfire severity was knowledge of weather and environmental conditions that the householder associated with bushfire. The householder's own subjective assessments of the likely severity of effects from a hypothetical bushfire (developed by talking with neighbours, receiving risk information or from media reports) are a key cue determining the propensity for protective behaviour. This finding partly mirrors theory proposed in the Health Belief Model (for reviews see: Abraham, *et al.*, 1998; Lee, *et al.*, 2005; Rosenstock, 1974), which suggests individuals are more likely to take preventative action against detrimental health issues when they consider the outcomes of those problems to be more severe. In the case of bushfire however,

not all householders react to perceptions of severe bushfires in this way. For example, several householders in the current study identified that their preparations were sufficient against a mild bushfire, but not a severe one. They also point out that should they be faced with a severe bushfire they would choose not to defend their home, or make the necessary preparations that would make the home defendable in a severe fire because they felt such action was too risky or impossible.

> *I'd make some kind of preparation in terms of, um, deciding to stay or leave depending on the extent of the fire.*
>
> *…probably if it was looking really serious we'd just evacuate. If it was a case of embers falling down and that sort of stuff, then we'd probably stay and deal with it. But if it sort of came to the point where, you know, a major fire front was approaching, or was likely to come to our house, we'd just evacuate.*
>
> *The thought of a big fire scares me a lot. I prepare, but my first thought would be to get out at the first opportunity. I think we could manage a small fire, but a big one would just be too much.*

Knowledge of fire weather and environmental conditions that promote bushfire (or that householders associate with bushfire) was a primary theme discussed by interviewees in this research. Householders know that a hot, dry and windy day brings greater chance of bushfire than a cool, wet day. The appearance of "bushfire weather", as householders often term these conditions, encourages greater bushfire salience, and often spurs householders to enact bushfire plans, review preparations, and in the worst cases begin preparing for the imminent arrival of a bushfire. For those people not confident with the thought of defending their property, these conditions encourage them to begin thinking about evacuation. Many also take the "wait and see" approach, hoping that no action will be needed after all. Likewise, knowledge of environmental conditions (understory vegetation density, recency of last fire, dryness of vegetation *etc*) is also used to build a picture of severity.

The relationship between perceived severity and the householder's choice in relation to staying to defend or leaving prior to the arrival of the fire is particularly important. Contrary to the current bushfire preparedness policy (AFAC, 2005), instead of preparing regardless of their decision to stay or go (as the policy indicates), most householders are deciding to stay or go based on their perception of how severe a fire will be – low severity leads to a choice to stay, high severity leads to a choice to go. If they then chose to stay and defend they are likely to make more extensive preparations. Many interviewees who are deciding to go report that they have made preparations, but if so, these preparations are minimal at best, and may

consist solely of ensuring they have hoses, buckets or ladders *etc* - items that most households would have regardless of whether they were living at risk from bushfire or not, and which might suggest that householders don't really understand what "being prepared" really means. If so, this is a significant issue for the agencies that communicate about bushfire risk. Given that these interviews were conducted at least six months after the release of the Tasmania Fire Service's *Prepare to Survive* DVD, this pattern of decision-making by householders (who presumably received this new risk communication information) suggests that the message about preparation is not getting through to householders for a variety of reasons: it is not well understood, it is not interpreted correctly; people might ignore the information if they feel they are already well-prepared; it may be ignored as a result of the unrealistic optimism bias (see section 1.4.1); it may be ignored because the *Prepare to Survive* DVD led to risk homeostasis and the transferral of responsibility for mitigating the consequences of bushfire to the Tasmania Fire Service (Ballantyne, *et al.*, 2000); or the householders receiving the DVD believed they could rely on it as a guide to prepare when they new the bushfire was approaching. Whichever is the case, the information supplied to at-risk householders in the *Prepare to Survive* DVD is not being acted on in the manner anticipated by the Tasmania Fire Service.

Perceived severity of bushfire does not increase the propensity for preparation for all householders, contrary to the proposition in the health belief model (Rosenstock, 1974). Here outcome expectancy plays a key role in the preparedness decision-making model proposed. People with positive outcome expectancy translate their beliefs about the threat of severe bushfire into an increased need to meet that threat with better preparations. Householders with negative outcome expectancy convert perceptions of severe bushfire into avoidance, which primarily equates to a choice to leave if bushfire is severe (and consequently not invest in making preparations around the home). So, while perception of severity is a key decision cue in the choice to make protective behaviours or not, whether it's role is a positive or negative one depends largely on a householders own confidence in bushfire preparations.

A consideration about the perception of bushfire severity highlights the dynamic nature of the bushfire preparedness decision-making process. Householders form their perceptions based on the information they have at hand, their experiences, the weather and environmental

conditions, their beliefs, attitudes and emotions on the day. If weather or environmental conditions are seen to change, most householders thoughts about outcome expectancy and self-efficacy are likely to follow suit.

> *I just sort of realise there are some precautions that I can take which are sensible, and there are others that I can't cope with and at that stage I would just have to leave, and make sure the house is well insured.*
>
> *…if a big fire came through, then we'd be in trouble… if it was looking really serious we'd just evacuate, if it was a case of a few embers falling down and that sort of stuff, then we'd probably stay and deal with [it], but if it came to the point where, you know a major fire front was approaching, or was likely to come to our house, we'd just evacuate.*
>
> *I think one of the main things, one of the main difficulties in the event of a fire would be knowing the severity of the fire and whether it was worth staying or going. In not a massive fire I think I'd feel comfortable trying to protect my property…*

When considering current weather or environmental conditions, perceptions of bushfire severity may change, affecting the stay or go decision at the last minute. Householders who think a possible fire may be less severe (based on their idiosyncratic mental model of fire characteristics) may resolve to stay and defend. If the weather or environmental conditions look particularly bushfire prone, then these same householders are likely to revise their decision at the last minute, placing themselves in a dangerous situation.

6.3 Conclusion

The research conducted in this thesis has applied and tested a theory examining human behaviour in relation to bushfire mitigation. While successful under some circumstances, the theory does not describe a generalised pattern leading to bushfire preparedness, owing principally to characteristics of the community that vary between locations and over time. In order to move forward the field examining disaster preparedness decision-making, it is necessary to take the results of this current research and build on the theory that has been tested in the preceding chapters.

The new theory presented in this chapter provides direction for future examinations of the decision cues that affect the choice to prepare for bushfire. This progressed theory aims to more fully describe the bushfire preparedness decision-making process by capturing a broader diversity of decision cues. While more complex than the model tested in the preceding chapters, with complexity comes flexibility, and once tested, this model should be considered a dynamic guide to be used in conjunction with techniques that can help risk

communicators become better informed about the communities they target and serve (for example, Cottrell, 2008).

One of the key benefits of the added complexity in this model is the ability to better accommodate community variability. One of the main issues identified when testing the original theory of bushfire preparedness was the inability to reconcile a theory developed using qualitative data collected from one community with quantitative data collected in another. These differences suggest householders' decisions about bushfire preparedness vary between locations (and may even vary over time in the same locations). Findings that support the concepts of iterative decision-making and the social construction of risk (Dake, 1992; Lupton & Tulloch, 2002), where communities may not see risk in the same way as other householders living in different social, environmental or institutional settings (Cottrell, 2008), or indeed the fire agency representatives who communicate about bushfire risk. In reality, fire service agencies should seek the capacity to slightly alter their risk communication activities to suit the needs of the specific communities being targeted (though this necessarily requires more, or more effective deployment of risk communication resources).

The importance of community variability and the social construction of risk do not negate the utility of modelling decision-making behaviour in the development of improved risk communication techniques. Instead, these factors point to the necessity of incorporating behaviour modelling with a mechanism to assess the character, vulnerabilities and capacities of the community being targeted. Cottrell (2008) proposes a framework based on community profiling that would enable fire service providers to assess demographic characteristics and changes, population transience or turnover, vulnerable groups, and critical social infrastructure, to help them create risk communication information or education campaigns that are tailored to a community's requirements or requests. It is widely recognised that community engagement of this type is essential for increasing and maintaining bushfire preparedness in at-risk Australian communities (Paton*, et al.*, 2008a; Paton & Wright, 2008; Prior & Paton, 2008).

In conjunction with a technique like community profiling (*e.g.* working closely with the community to identify the collective characteristics that may help or hinder risk communication activities), the bushfire preparedness decision-making model becomes a dynamic tool, rather

than a static representation of process. In particular, community profiling can help fire service providers to better understand the unique characteristics of the communities they serve, and how these characteristics may change through time. For example, profiling may identify ongoing changes in community structure and demographics, bushfire specific characteristics like knowledge or experience, or determine how bushfire risk perception or salience might change if the community is provided with risk education or communication materials. Up to date knowledge of the community can allow bushfire management agencies to tailor risk information to the needs of the community. With more community-specific knowledge, the model of bushfire decision-making can be altered to better represent decision-making in each community and at a specific point in time. Like standardising risk information, relying on a standardised model of preparedness decision-making is counter-productive. The current model should provide bushfire risk communicators with a guide, which should then be complemented by community engagement.

A dual approach to the development of bushfire risk communication information can best be illustrated using two examples. Firstly, survey response rates from Lindfield, in Sydney's northern suburbs, were surprisingly low given the surveys were distributed by a Community Fire Guard representative, also a member of the community. While not explicitly examined, anecdotal evidence suggests this may be attributed to high turnover of residents in the community (half of the respondents had lived in Lindfield for an average of 4.7 yrs, while the other half had lived there for an average of 35 yrs). Newer members of the Lindfield community exhibited little knowledge of bushfire in their region – many of whom had no knowledge that houses were lost to bushfire in the surveyed street just nine years prior to the survey's distribution. This suggests there is also little discussion about bushfire risk and mitigation between the old and new residents, indicating a lack (or loss) of sense of community with the resident turnover.

In another case, households surveyed on the peri-urban fringe of Middle Cove, in Sydney's Middle Harbour region, were some of the least prepared and least bushfire aware survey respondents in the Sydney sample. Middle Cove is a wealthy suburb within easy access of the city centre. It is a sought after address, where new residents are primarily seeking harbour views. Middle Cove is quite hilly, and many of the top most sections of the ridges are

developed, while the creek lines and lower sections of the ridges are designated bushland reserves. One householder included with his incomplete survey a special note describing his consternation at being included in bushfire research when there was clearly no bushfire risk where he lived – he was kind enough to include his address in the letter. A quick search on *Google Earth*™ revealed his front door opened onto an arterial route in Sydney's northern suburbs, and his rear balcony took in a view directly over Middle Harbour. Between his property and the harbour was an extensive tract of highly bushfire prone native *Banksia* spp. dominated vegetation, which was clearly not in his line of sight.

Both examples highlight the way in which different individuals interpret and understand their environment and the risk it presents, providing illustrations showing how risk is socially constructed. Social construction of risk also contributes to the way different individuals understand and interpret the information they receive about environmental risk. Modelling bushfire preparedness decision-making gives a general picture of how risk communicators can target decision cues to increase preparedness, but direct engagement with the community can hone this picture, benefiting both the risk communication messenger and receiver. In the first example community engagement could highlight the fact that high resident turnover is degrading the social networks in the community and decreasing sense of community, possibly because new residents are not connecting with the older residents – perhaps the social networks of the new residents exist outside of the neighbourhood (Forrest & Kearns, 2001; Morrison, 2003). As a result the important resource that is local bushfire knowledge and awareness (Indian, 2008) is held by only the older residents. Engaging the community in bushfire risk communication may draw the community together around a common fate (Portes, 1998; Prewitt Diaz & Dayal, 2008), thereby encouraging the diffusion of information about bushfire, increasing bushfire awareness, and hopefully increasing the likelihood new residents better understand the environmental circumstance they have moved into and become more interested in mitigating their bushfire risk.

In the second example, community engagement could identify salience as a key factor in the choice not to prepare. For the survey respondent, a view of the harbour is a more salient concern than the possible threat of bushfire. If this respondent represents a typical attitude about bushfire among members of the Middle Harbour community, then community

engagement can be an important tool to identify this issue. For fire services developing a bushfire awareness and preparedness campaign in this area, bushfire salience would be a component of the program (as directed by the model of preparedness decision-making), but community engagement by the fire services would identify the need for additional effort in increasing the community's bushfire salience.

The dual approach to risk communication informed by modelling decision cues, and refined by community engagement is essential because it allows risk communicators to best target their information on decision cues that are particularly important in a given community. With a model of preparedness decision-making such as this, the fire service risk communicator can first get an indication of the types of cues householders are likely to be considering when deciding to prepare for bushfire or not. However, with concerted community engagement fire services can identify those decision cues that are particularly important, and which may vary somewhat between communities. Community engagement can ensure that risk communication effort is invested where it is most needed. Community engagement can also identify key groups within the community that either need extra support to prepare (like new residents), or who can contribute valuable local knowledge (like older residents) and assist the diffusion of risk communication information (Rogers, 1995) throughout the community.

The objective of Australian bushfire risk communication is to increase and maintain high levels of household preparedness in bushfire risk areas (AFAC, 2005). However, recent research examining bushfire preparedness (including the current research) suggests the goal of increased preparation is not being met (Paton, 2006b; Paton*, et al.*, 2008a; Paton*, et al.*, 2006a; Paton & Wright, 2008; Prior & Paton, 2008; Tibbits & Whittaker, 2007), five years after the identification that bushfire preparedness was a significant public policy issue in the wake of the Canberra bushfires of 2003 (McLeod, 2003). These research findings suggest a need to explore alternative risk communication and education mechanisms. Utilising the above methodology presents just such an alternative. If used, the objectives and goals of future bushfire risk communication must remain as they presently are, and reflect the current policy. However, to best tailor communication or education campaigns to the community, a decentralisation of components of bushfire risk communication delivery is necessary. Traditional, mass awareness raising techniques now used should still find a place, and does

appeal to many householders (EMRS, 2008), but financial and administrative resources must also be directed towards community level engagement and action.

7. General Discussion

It is frequently assumed that distributing information on bushfire hazard to at-risk householders will encourage their preparation. Unfortunately, this assumption is unfounded (Paton, 2003; Paton*, et al.*, 2000a). Each bushfire season, substantial financial resources are directed at encouraging bushfire preparation in Australia, particularly in peri-urban settings. Preparing for bushfire reduces the risk of loss and injury, facilitates coping with bushfire consequences, and minimises damage and insurance costs. However, despite the attention directed toward this task, the goal of ensuring sustained levels of bushfire preparedness has proved elusive (Collins, 2008; Cottrell, 2005, 2008; McLeod, 2003; Paton*, et al.*, 2008a; Paton*, et al.*, 2006a; Paton & Wright, 2008; Prior & Paton, 2008). It is well recognised that under-prepared communities present a significant public policy issue (AFAC, 2005; McLeod, 2003). Consequently, developing more effective public outreach education programs continues to be an important bushfire risk management goal.

With bushfire hazard the process of risk communication and education is complicated by the fact that effective preparedness and action involves a mix of household and community preparedness. That is, decisions are made not just at the level of the individual or household, they are also made in collaboration with others: neighbours, friends and family, some of whom share the same risk. With regard to the latter, collective action is required, for example, to support burn-offs or controlled burns and to ensure that all households reduce the level of combustible materials in and around their properties. The Australasian Fire Authorities Council (AFAC, 2005) acknowledges that under- or unprepared properties are a risk themselves, but also endanger neighbouring properties and the fire crews who respond to fight bushfires. Consequently, an understanding of what determines bushfire preparedness at individual and community levels will considerably improve bushfire hazard management and response (Paton*, et al.*, 2006a; Paton*, et al.*, 2006b). To date, no research has examined the predictors of collective decision-making or the social contexts that influence this process from a bushfire preparedness perspective.

This thesis had the objective of identifying and testing an evidence-based model of householder bushfire preparedness decision-making that integrates individual and community

processes. In achieving this objective, the research identified diverse sources of individual and community level decision cues. Modelling bushfire preparedness decision-making has also identified how personal beliefs (*e.g.* outcome expectancy or intention), community beliefs and competencies (*e.g.* sense of community or collective problem solving) and institutional factors (*e.g.* agency trust) influence the degree to which people prepare for bushfires. This information can then be used to provide emergency management agencies with information that can assist the development of risk communication practices designed to facilitate the sustained adoption of actions that mitigate risk and reduce loss from bushfire disaster.

In conducting this research several key findings about bushfire preparation and their implications for bushfire risk communication/education have become clear. Firstly, the research confirms work by Paton and colleagues (2008a; 2006a) indicating householders make a dichotomous choice between preparing and not preparing, with discrete processes influencing each choice, but where this choice is by no means definitive, changing on an iterative basis. Also, bushfire preparedness in Hobart and Sydney remains low, in spite of new risk communication activities in Hobart, and the occurrence of severe bushfires during the research period (adjacent to sampling areas). Where bushfire preparedness is undertaken it is quite haphazard, with few people systematically planning their preparations. This is partly an artefact of risk communication practices, particularly householders misunderstanding the message about staying to defend the property or leaving early. Lastly, the importance of “community” and collective action in bushfire preparation points to the necessity of incorporating community into bushfire risk communication activities, moving beyond information dissemination toward information sharing and engagement, and including the public in decision-making that will affect them. Each of these key findings is discussed below, with special reference to their implications in a risk communication context. This discussion is followed by a summary of the research implications for risk communication, an indication of the areas where this research could be improved, and an outline of the future research direction that these findings warrant.

7.1 The “Preparedness Dichotomy”

Confirming research by Paton and colleagues (2008a; 2006a; 2005), *chapter 4* shows that the decisions householders make can either increase the likelihood of their preparing or increase the probability of their deciding not to prepare. The “preparedness dichotomy” is of particular importance for risk communicators because it reiterates that when given the same information (as traditional mass risk communication processes do) different people understand and/or interpret it in very different ways. Householders’ choices are influenced by a variety of factors, but this finding shows that each choice is supported by a separate set of decision cues, which are driven primarily by the householders’ confidence (outcome expectancy) in the preparations advocated by bushfire risk communicators. That each choice is influenced by a separate set of decision cues has important implications for bushfire risk communication, most notably the need for distinct information targeting both branches of the decision process (Paton & Wright, 2008).

This thesis has contributed key novel findings regarding how householders choose between preparing and not preparing, which will be of considerable importance for future natural hazard preparedness research. While earlier work examining bushfire preparedness (Paton*, et al.*, 2006a) in Australia identified the preparedness dichotomy, it was unable to identify why this dichotomy occurred, citing “critical awareness” (the frequency people think about or talk about bushfire issues) as the factor predicting both preparing and not preparing. The critical awareness variable provides an indication of householders’ deliberations and discourse concerning bushfire, but cannot identify whether these thoughts or discussions are positive or negative. Deeper examinations of the predictors of preparedness conducted as part of this thesis (*chapters 2* and *4*) demonstrated a link between outcome expectancy and bushfire preparation (Paton*, et al.*, 2008a). People preparing generally believed their preparations were an effective strategy to mitigate bushfire threat, while those not preparing felt their safety would not be increased if they prepared. The role played by positive and negative outcome expectancy in determining preparedness has since been demonstrated in the context of other natural hazards (Paton*, et al.*, 2008b; Paton*, et al.*, 2008c).

Future bushfire risk communication or education programs must seek to address the root cause of the choice between preparing and not preparing. Passive, mass communicated information concerning bushfire preparedness has a place, and some householders find this information helpful when beginning or improving bushfire preparations around their properties. However, people with negative outcome expectancy (poor attitude toward or lack of confidence in preparing) are unlikely to respond to such information, either because they believe it advocates illogical behaviour, or because they attribute uncontrollable affects to the hazard in response to assumptions about the hazard's uncontrollable causes (Kumagai*, et al.*, 2004; Paton*, et al.*, 2006a). Paton and Wright (2008) suggest the necessity of risk education programs to separate uncontrollable causes from controllable consequences – a considerable volume of research attests to the benefits of preparing to mitigate bushfire consequences, and this must be communicated effectively to the public. Such a suggestion requires information sharing between the public and emergency management sector to increase public knowledge and awareness of bushfire behaviour and characteristics, and weather and environmental conditions that contribute to bushfire. Coupling this with a risk communication approach that highlights the practical use of bushfire preparations, citing examples from communities where bushfire preparedness has yielded successful outcomes, will help to engender positive outcome expectancy beliefs in the target population. An interactive approach to risk communication will empower communities and encourage them to accept risk and become more knowledgeable about bushfire threat (Prior & Paton, 2008).

7.2 An Exception or the Norm?

Chapter 3 demonstrated that preparation is by no means a given in communities that are at risk from natural hazards. In the case of bushfire, being well prepared to meet the threat and mitigate the impact of bushfire is in fact the exception, rather than the rule. The research has also identified that it is quite difficult to get an accurate idea of how well prepared at-risk householders and their communities actually are. Three issues support the contention that bushfire preparedness is generally low in the surveyed locations: that householders mostly have low confidence (negative outcome expectancy) in the advised bushfire preparations; that householders know the "stay or go" message, many choosing the later, and associating

this with not needing to prepare; and, the focus by householders on “soft” bushfire preparations, which are easy to undertake, but once done, don’t always equate with a well-prepared household.

As noted above, the choice to prepare is initially influenced by positive outcome expectancy. One-on-one telephone interviews with householders suggested that many held negative views about the ability of preparations to assist in the defence of a house threatened by bushfire. Householders who don’t believe preparations will benefit them are rationally going to choose not to prepare, and as identified, require targeted assistance to encourage them to actually undertake the recommended protective behaviours. Based on the modelling conducted in this research, without concentrating on building householder confidence in bushfire preparation (see for example Paton & Wright, 2008), general community preparedness levels will consequently remain low.

The “prepare, stay and defend or leave early” policy adopted by Australian fire management agencies, and advocated in the current bushfire risk communication is a sound policy with demonstrable benefits for householders and agencies alike. However, where this policy is compromised, as this research shows, is in its communication. Analyses in *chapter 4* suggest that the householder’s choice between staying to defend a property, or evacuating early has significant implications for the development of an intention to prepare, and for their preparation (*chapter 6*). Householders who decide to stay and defend are more likely to make preparations than those who choose to leave. In line with current risk communication policy (AFAC, 2005), the need to choose between staying or going is made quite clear by both fire service agencies whose jurisdictions were surveyed in this research, but both also point out that householders should prepare regardless of their stay or go choice. Clearly householders are misinterpreting the stay or go message, and a lack of confidence and perceived difficulty of some preparations (see below) likely exacerbates this issue. Tibbits and Whitaker (2007, p. 290) suggest the stay or go message “is the single most important strategy for protecting people and property from bushfires”, but if householders are misinterpreting this message, or misunderstanding the complementary need to prepare regardless of this decision, then the strategy is flawed. Current public policy (AFAC, 2005; McLeod, 2003) directs that preparedness is the key to building community resilience to bushfire threat, so bushfire risk

communicators must promote the message that all people should prepare if they live at risk of bushfire in order to gain a more efficacious result for their efforts. Based on the results presented in this thesis, I would suggest the “prepare regardless” message has been lost in the hubbub associated with the “stay or go” message – both are equally important messages and must be communicated in ways that engender consideration by householders. As such, better and more widespread preparation is the fundamental goal of bushfire risk management agencies, so this should be the first objective of an education campaign. Fire management agencies must then communicate the complementariness of the stay or go directive, specifically indicating how being well-prepared can ensure the safety of either choosing to stay and defend or leaving early. Other important implications for bushfire risk communicators associated with the “stay or go” message and its misinterpretation are considered in section 7.3.

Preparing for bushfire can take the form of myriad protective behaviours. All contribute something to the ability of the householder to successfully defend their property when threatened by bushfire, although the individual value (in terms of how it contributes to bushfire safety) of each preparation behaviour and the difficulty (the knowledge, skill, time or money required) to accomplish them varies considerably. For example, creating a defendable space around the home, and ensuring an alternative source of water are crucial for an easily defendable property. The defendable space is an example of “soft” preparations, those that require little specific bushfire thinking, and may be undertaken around the home as a matter of course (even by householders not at risk of bushfire), rather than with the specific intention of mitigating bushfire threat. By contrast, “hard” preparations like an alternative water supply, are those that require the householder or community to have considered their bushfire risk, thought about how they can address this risk, and undertaken protective behaviours that go beyond basic activities. *Chapter 3* identified that those few householders who were well-prepared had undertaken a broad mix of soft and hard preparations, and this observation was confirmed in *chapter 4*. The results presented in these chapters suggests the tendency of some householders to choose to make minimal “soft” preparations (*e.g.* mowing the lawn or cleaning gutters of leaf litter) around the home may be an indication of their assessment concerning the costs and benefits of preparing, which is closely linked to their outcome

expectancy. Where the benefit of preparing is perceived to be high, or where confidence in preparation is high householder are likely to invest more time, effort or money into ensuring they are well-prepared. To counter this dilemma risk communicators must promote protective behaviours with multiple and recognisable benefits (*chapter 3*), for example, household water tanks are a large investment, but provide extra water in times of drought and act as an alternative water supply to be relied on during bushfire activity – their installation provides the householder with several benefits, and this is an appealing feature for the householder (who has finite financial resources and must choose wisely on how these are used). Therefore, identifying the multiple opportunities that some bushfire preparations can yield may be an effective means of encouraging the adoption of these protective actions.

The propensity of householders to undertake "soft" preparations over the more challenging "hard" preparations may also be a reflection of their inability to translate good preparation intentions into action. Several key factors including planning skills, risk compensation and low sense of community (section 6.2.1) have been shown to reduce the ability of individuals to act effectively on their intentions (Lippke*, et al.*, 2009; Lippke & Ziegelmann, 2008; Paton*, et al.*, 2006a; Paton*, et al.*, 2005; Schwarzer, 2008; Wiedemann*, et al.*, 2009). It is quite likely that people report having undertaken the "soft" preparations because they lack the skills, knowledge or individual/community resources that might help them to work through the harder aspects of bushfire preparation, and which would see them much better prepared than they actually are.

Making checklists of important preparations also seems to distract householders from adopting a mixture of soft and hard bushfire preparations, and exaggerates the focus on "soft" preparations. While it is a convenient means of identifying what has been done, and what should be done around the home, the checklist may lull householders into a false sense of security. For example, if householders see that they have met half of the requirements on a checklist (these being the soft options) they are likely to consider themselves mostly prepared, and give bushfire threat no further thought until it appears at their back fence. Ticking off that one has long hoses, has cleared the gutters, trimmed branches or mowed the lawn is very reassuring for many householders, but in reality does not give a good indication of their bushfire preparedness, nor does it exemplify "good preparation". The same may be

said of the 54-item preparedness scale used in this research: it gives a relatively good indication of preparedness through self-reporting, but under closer examination against in-depth qualitative data, this indication may be somewhat misleading, in part contradicting market research demonstrating the success of a recent bushfire education campaign in Tasmania (EMRS, 2007, 2008).

The data presented in this thesis point to an important, but overlooked dimension of preparedness in risk communication: it is as much mental as material. Without hoses and ladders sparks cannot be doused and eaves cannot be checked. But preparation is also dependent on a mindset, which is influenced by one's attitudes, emotions, experiences and by the people with whom we associate. Whilst the Australasian Fire Authorities Council (AFAC, 2005, p. 6) points out that a key factor in bushfire preparedness is the "mental and emotional fitness of the people" at risk, little effort seems to have been directed toward stimulating these capacities, with all effort concentrating on the mechanical (or material) aspects of preparedness. This "bushfire response mindset" requires the householder to consider their ability to deal with the threat of bushfire, something most people seem not to have done systematically, and cements the contention that few householders living at-risk of bushfire are well-prepared. The material components of preparedness must be accompanied by the mental components. That this is not the case highlights a major flaw in bushfire risk communication, which has traditionally focussed on passive information dispersal regarding what actions should be taken around the home (the material). However, it is well shown by this research and other work (Johnston*, et al.*, 2005; McIvor & Paton, 2007; Paton, 2003; Paton*, et al.*, 2008a; Paton*, et al.*, 2008b; Paton*, et al.*, 2006a; Paton*, et al.*, 2005) that people decide to prepare based on socio-cognitive processing of a wide range of factors, mental and material, and do not generally rely on information *per se* to direct their protective behaviour (Paton*, et al.*, 2000a). As identified in risk communication policy (AFAC, 2005), emergency management agencies should foster the development of a mental/psychological capacity to prepare (and defend if necessary) in conjunction with the material capacity, and this will require a considerably more active approach to risk communication that involves information sharing, engagement and trust. How this might be accomplished will have to be the subject of future research.

7.3 Bushfire preparation is generally haphazard

A key message in contemporary bushfire risk communication programs is the importance of early bushfire planning - “making a plan and sticking to it when the chips are down” (Claire, interviewee 2007). However, research in this thesis suggests that householders’ decisions about their bushfire risk management plans are customarily dynamic - influenced by their emotions, knowledge and experience, other people, their environment and weather, bushfire warnings and the media. Many of these change on a situational or contextual basis, influencing all aspects of their decision-making – including that relating to bushfire risk. Householders’ decisions about bushfire preparation are also strongly influenced by the uncertainty of bushfire. In particular, this research has demonstrated that this diverse (and often contradictory) thinking contributes a great deal to the attitudes of at-risk householders toward preparing and staying to defend when bushfire threat is imminent.

The haphazard nature of bushfire preparedness witnessed in this research can be attributed largely to householder perceptions regarding bushfire severity. Because of the unpredictability of bushfires (Will there be one this year? Will it be big? Will I have time to get out of the house?) people do not seem intent on making exhaustive preparations. Most notably, householders believe a flexible attitude towards preparing is the most rational approach to bushfire mitigation. Preparing requires an expenditure of effort on the part of the householder, and once made people expect that expenditure to be of use and benefit in the future. The difficulty for householders when contemplating whether to make this expenditure of effort (hopefully beginning with the formulation of their household’s bushfire plan) is the impossibility of anticipating how severe bushfire might be when it comes. Householders may be willing to make plans to prepare, stay and defend if they perceive bushfire severity will be low. But the research conducted here suggests they are unlikely to expend effort on, or invest in preparing if they believe the fire’s severity will be too high, and meaning that their effort will be wasted. Compounding this perception is the belief that if fire does actually come, then it will be “the luck of the draw” as to whose house is burned and whose is spared, irrespective of the preparations that have been made.

> *I guess sometimes it might just be a bit of luck too… where the fire gets into the roof or whatever. I don’t know enough about fires to know how they miss one house and get the next.*

It's all based on luck – some houses burn and others don't, and there's not much we can do about that.

For many at-risk householders the dual uncertainty of fire occurrence and the question about investing in this uncertainty, coupled with a perception that preparing may not help in any case if the fire is severe, leads to indecision about how to best approach the problem presented by the threat of bushfire. While there are two choices, do we stay and defend the property, or leave when bushfire threatens, the distinction is a blurry one. This duality results in "bet-hedging" behaviour that poses a dangerous situation for homeowners, but one they perceive as the most convenient and logical. Undertaking minimal ("soft") preparations allows these "bet-hedgers" to feel as though they've done something toward defending their home. They have made preparations that are not too extensive, but which they feel makes them safer. A smaller investment also allows them to feel as though they need not stay to defend their property and realise this investment, especially if the fire is severe.

…well you don't really prepare until it's really on your doorstep, do you? Well we don't think about it, we don't think, well when are the bushfires coming – it's like, oh, bushfire's just over the hill, oh dear, get the hoses ready, um, that's about all we can really do. I've got stuff packed away that if we have to evacuate I can take.

…if there was [a fire] on the mountain and I was aware of it early, yeah I would fill the gutters and do a bit like that, you know, and then take off early.

…in terms of what you do to prepare varies depending on, you know, access to equipment and money and all that stuff.

After all, it's easier to take out more insurance than to stay and defend and endure the fear, anxiety and uncertainty that comes with bushfire.

It doesn't make sense to stay if you're threatened by bushfire, that's what you get insurance for…

These householders are hedging their ability to defend their property (and relying on their minimal preparations) against the bet that if bushfire does come it will not be severe.

The choice between staying or leaving early is a key message in bushfire risk communication, but its communication poses challenges for bushfire management agencies. Evidence from Tasmania (Prior & Paton, 2008) and Victoria (Tibbits & Whittaker, 2007) suggests the "stay or go" message is not interpreted by householders as it is intended. In maintaining flexibility and convenience in their actions concerning bushfire threat mitigation (when there is uncertainty about the severity of bushfire), the householders often don't follow the advice of risk communicators. Fire management authorities recommend at-risk homeowners prepare their properties regardless of their final decision (AFAC, 2005). If householders plan to stay and

defend they are advised to make the additional necessary preparations that would safely allow this course of action, otherwise they should leave early. Planning for flexibility rather than safety may make sense to the homeowner, but it means neither course of action (and the necessary activities that support that action) is acted on sufficiently in order to make staying or going safe. Being flexible and planning for convenience seems like common sense for many interviewees, but leads to dangerous, last minute decision-making.

> *That's the critical thing, and that's where I probably don't have a good answer. My plan is to stay, but yeah, I guess once you've made a plan you stick to it, not try to run off at the last minute. I don't know…I probably would stay, but I'm aware that's a pretty risky thing.*

The difficulties associated with householders choosing to be flexible in their preparations, "bet-hedging" behaviour, and the consequential haphazard nature of preparation are natural responses by householders to the inherent uncertainty of bushfire. Even after pointing out that all at-risk householders should prepare, and that staying to defend is a safe course of action for a well-prepared household, the Australasian Fire Authorities Council (AFAC, 2005) recognises that under some circumstances properties may be un-defendable (depending on house construction, location or intensity of bushfire) and ordered evacuations may be necessary. This demonstrates the Australian peak fire management agency's acceptance of bushfire's uncertainty, and the need to meet that uncertainty with equal parts caution and compromise. However, while the likelihood and severity of bushfire in one location in one season may be relatively unpredictable (though the ability to predict where and when bushfire will occur is increasing continually), Australians living in bushfire risk areas can expect to be threatened at some point if they remain in these environments for any length of time. If bushfire risk management agencies can disassociate the element of time from this "predictability" in their communications to the householder, then preparing may then be considered to be an imperative, against which an investment of effort or money will be seen as worthwhile whether the fire comes next year, or in 15 years.

In admitting that bushfire brings with it uncertainty and that this must be anticipated and met with some versatility, bushfire management agencies must also appreciate that householders will take a similar approach to their bushfire preparation. A clear, forthright dialogue with the community can ensure householders know where they stand, allow them to explore and question the different aspects of bushfire preparation, and provide them with the means to

determine how they should best address bushfire threat given their particular circumstances. While this awareness may not directly contribute to greater levels of preparedness (Duval & Mulilis, 1999; Emdad Haque, 2000; Grothmann & Reusswig, 2006; Jakes, 2002; Mulilis & Duval, 1995; Nelson*, et al.*, 2004; Paton, 2003; Paton*, et al.*, 2008a; Paton*, et al.*, 2008b; Paton*, et al.*, 2006a; Paton*, et al.*, 2000a; Prior & Paton, 2008), it will nonetheless give people the wherewithal to address the bushfire risks they face as individuals, households and communities.

7.4 Collective Action in Community Bushfire Preparedness

The research conducted here has highlighted the importance of "community" in bushfire preparedness. All natural hazards cause disruption to the household and community, but unlike other natural hazards, in the case of bushfire, collective action can help to reduce this disruption and increase the resilience of a community to bushfire threat (AFAC, 2005; Paton, 2006b). While most householders don't specifically recognise or acknowledge this particular benefit of community action in bushfire preparedness, they are still capable of identifying a raft of advantages that their social networks and social capital bring to their own bushfire preparedness. This alone demonstrates the import of collective action and support, regardless of the scientific or policy imperatives that a sense of community can deliver for more effective risk communication. As such, a key issue for bushfire risk managers involves encouraging the development and use of social networks as important bushfire preparation resources.

The community or neighbourhood should be used by bushfire risk communicators as the key (but not sole) mechanism by which to pass preparedness information. While this is by no means a new proposal (Paton, 2008b; Paton*, et al.*, 2008a; Paton & Wright, 2008; Prior & Paton, 2008), several novel findings from this research provide added support for this assertion by again highlighting the role social interaction among community members can play in helping the collective understanding and interpretation of risk information. Firstly, two elements of community, place attachment and belonging (termed sense of community *place* and sense of community *people* respectively) were shown to play different, but equally important roles in boosting community bushfire preparedness. Both these elements of

community influence the social construction of risk (Dake, 1992; Hannigan, 2006; Holstein & Miller, 2006; Lupton, 1999; Lupton & Tulloch, 2002; Tierney, 1999), which determines how people react to or deal with bushfire threat (Cottrell, *et al.*, 2008). Accordingly, because each community is subject to varying influences (*e.g.* different demographic, cultural or geographic features) they develop quite different characteristics, so a standardised approach to bushfire risk communication may not be an appropriate method of raising bushfire preparedness levels throughout an at-risk population. Lastly, householders identify that belonging to strong social networks in a community brings several benefits they associate with assisting their preparations, which include leadership, peer trust, mental and material support. Each can affect an individual's understanding or interpretation of the risk communication message, but each may be just as useful for increasing the efficacy of a risk message when tapped into by the risk communicator.

Sense of community *place* and sense of community *people* are two aspects of community that played a core role in the formation of a choice to prepare for bushfire. Sense of community *place* (If assumed to be equivalent to the place attachment construct, see Low & Altman, 1992) describes an attachment or connection to a geographical location, but may just as easily describe an attachment to the family home. If community members share feelings of geographic attachment, then they may be more likely to develop social networks that see them participating in communal activities, which might extend to sharing information about bushfire preparation, and assisting and supporting each other in protective activities. Paton *et al.* (2006a) note that attachment to place is often driven by environment and lifestyle, which may sometimes be at odds with the need to prepare for bushfire. For example, people choosing to live in high bushfire risk areas for lifestyle reasons (because being surrounded by native bush is appealing) may be less likely to maintain a defendable space around their property because this action contradicts the values that brought them into this environment in the first place.

By contrast, strong attachment to the family home is likely to increase the desire to be well-prepared for bushfire, and resolve to defend the home if bushfire threatens.

> *I know how quickly the fire can move, and I know how powerless you can be, and I've got a beautiful celery top house, which I love, and that's what scared the life out of me when it came*

forward – because I thought the house was vulnerable being made of wood, and so you know I've done things like have my gutters enclosed, so that sparks can't go in there.

This attachment is more personal, influenced by emotional and/or financial factors, and the incentive that protecting an investment brings. Attachment to the family home is likely to strengthen with the length of residence, and *chapter 3* showed that increasing length of residence and home ownership were associated with increased householder preparation. DiPasquale and Glaeser (1999) showed that homeownership and particularly the length of residence are connected to the development of social capital in a community, primarily because ownership was associated with longer tenure in one location. The development of social capital within the community is likely to lead to an increase in community bushfire preparedness as householders recognise their social responsibilities and become interested in the safety of their neighbours.

Low and Altman (1992) indicate that attachment to place often leads to the development of emotional bonds between community members, and in turn builds a sense of belonging not just to the location, but to the people living close by. *Chapters 4* and *5* provided theoretical and empirical demonstrations of the link between sense of community *place* and *people* when modelling preparedness decision cues in Hobart. However, the empirical relationship was weaker in the Sydney data, and anecdotal information suggested the social cohesion decision cues (sense of community *people* and collective problem solving) played less significant roles in the preparedness decision-making process among those Sydney residents surveyed. This may be an artefact of greater community heterogeneity within Sydney suburbs, where the larger city supports greater diversity in culture, and the attitudes, beliefs and experiences this diversity brings. This contention is supported by Wirth's (1969) theory of urbanism that suggests that increased size, density and heterogeneity in urban populations results in a fragmentation of social ties. Alesina and La Ferrera (2000) also point out that greater diversity in the community leads to lower group participation and less active social networks based within a locality. Instead householders in these heterogeneous localities develop and rely on social networks outside of their suburbs (Forrest & Kearns, 2001; Morrison, 2003). While social networks may not necessarily form around the need for bushfire preparedness, they may provide a mechanism or opportunity that should be used to help information about preparing be passed among the community members.

The key benefit sense of community brings to bushfire preparedness may well lie in the psycho-social and material support it brings to that community. Sense of community fosters emotional and informational belonging among community members, and these "resources" positively influence risk and mitigation beliefs so that bushfire preparation becomes the norm in the community rather than the exception. In their definition of sense of community McMillan and Chavis (1986) largely omit the role of place attachment, concentrating more on the direct social aspects of sense of community. They suggest sense of community has four elements: membership (belonging), influence (that your membership matters to the group, and the group to you), reinforcement (a member's needs are met by their membership in the group), and shared emotional connection. This definition matches closely with the main benefits householders attributed to sense of community when discussing their bushfire preparations (Hobart householders only), and which are largely associated with the assistance they receive by belonging in a community-based social network.

Householders indicated that leadership, trust in their peers, and mental and material support were the most important derivatives of sense of community (see section 4.3.2). Leadership was important because many householders felt they could be better prepared if their preparations were directed by more experienced members of their community who held a broader local knowledge about bushfire. This direction from community peers was more trusted and more practically applicable and understandable than information received from bushfire education campaigns or fire agency personnel. Trust in these peers is cemented by the recognition of a shared fate (Portes, 1998; Prewitt Diaz & Dayal, 2008), and the confidence brought by membership in a collectively supportive community. That support leads to a sharing of the burden that is bushfire threat – both in a mental and a material sense. *Chapter 4* demonstrated that people who feared fire or who felt they lacked the capacity to effect adequate preparations could draw on their communities for support in the event that bushfire threatened. This applied broadly to people who prepared and those who did not prepare. Knowing that the mental and material burdens of bushfire can be shared among neighbours is vitally important for many householders.

Whether householders develop social networks within or outside of their suburbs has important implications for their social construction of risk, and their ability to understand and

interpret risk communication information. Each person constructs their own idea of environmental risk, but these constructions are strongly influenced by social and cultural processes (Cottrell, *et al.*, 2008). Rogers (1995) notes that interpersonal channels are very important when information or ideas diffuse through a community, and Mosler (2006) identified that minorities (like influential or knowledgeable members of the community) could be extremely persuasive if the information they provided was convincing and trusted (though not necessarily true).

The qualitative findings discussed in *chapter 4* suggest that collective action in bushfire preparedness is largely driven by a small number of people within a community. Their local experience and knowledge of bushfire has shown them the necessity and benefit to be gained for the whole community when individual households prepare. Indian (2008) points out the value of local bushfire knowledge, particularly in a fire management sense, but local knowledge is also a valuable resource for the community itself. Qualitative findings from *chapter 4* showed that less experienced or less confident community members rely on the influential and respected members of their communities, whose bushfire knowledge and direction is valued and trusted. Modelling in *chapter 5* confirmed these qualitative findings, demonstrating that information from people with similar interests and living in similar circumstances increases an understanding of bushfire risk and assists in deciding what to do (Paton, *et al.*, 2008a). Where local knowledge of bushfire and bushfire risk is shared within a community, that knowledge becomes a common resource, helping to establish an accurate construction of bushfire risk, and foment a collective approach to mitigating bushfire threat. Knowledgeable residents help to translate and diffuse risk information throughout the community, so they can also act as a valuable point of contact for fire management agencies (Indian, 2008).

This research has therefore shown that knowing the community and using the community may be the fire manager's greatest tool in engendering individual and community bushfire preparedness. As important as knowing how bushfire behaves, or how best to douse the conflagration, is a knowledge of the householder's thoughts on bushfire and the associations between community members that influence these thoughts. Agencies must understand and interact with community members in meaningful and practical ways, and in this way they

should play just as significant role in the householder's social construction of risk, because the information they supply can diffuse through the community, contributing to individual beliefs, attitudes or emotions concerning bushfire risk. Whilst it could be easily argued that, at present, this influence does not always yield positive outcomes that embody the proffered advice, with some effort on the part of fire management agencies, their information can feed the experienced and knowledgeable community leader, and filter to the remainder of the community. The New South Wales Fire Brigade's Community Fire Guard could be a useful template for knowing more about the community and feeding information into community-based networks. Likewise, the Tasmania Fire Service's Community Liaison section provide an important link to the community. Yet these structures are under-resourced and under-utilised, especially if we think that the primary concern of bushfire management is the protection of life and property. Short (1984) introduced the need to integrate sociology into risk analysis, purely because hazards become disasters only in the presence of human settlement or society. Risk communicators must begin to engage with the public, rather than disseminating information to them and relying on its passive uptake (Cottrell, 2008; Gregg*, et al.*, 2007; Indian, 2008; McIvor & Paton, 2007; Paton, 2008b; Paton*, et al.*, 2008a; Prior & Paton, 2008; Tibbits & Whittaker, 2007).

7.5 From Risk communication to Risk Engagement?

Gone are the days when the advice of scientists or governments was followed implicitly. With time the distance between the "expert" and the public has gradually diminished, to the point where almost every aspect of our lives is now measured, monitored, described or dissected. This closeness has brought an extra level of accountability to the technical expertise in science or government: a public who is educated, information seeking and capable of logical deduction. For the science-society relationship, an often irreconcilable difficulty lies in the tensions this extra accountability raises "between perception and fact or reason and values" (Graffy & Booth, 2008, p. 133). The public is now more likely to question the directives of institutions or scientists, rather than following them unconditionally.

Natural hazard risk communicators have not avoided these difficulties. Together with a significant literature (Eiser, 1998; Gregg*, et al.*, 2007; Grothmann & Reusswig, 2006; Paton,

2003, 2008b; Paton*, et al.*, 2008a; Prior & Paton, 2008; Siegrist & Gutscher, 2008) this thesis has demonstrated that householders at risk of natural hazards respond to risk communication messages in a way that reflects their beliefs, attitudes, emotions and experiences. Their responses may not be entirely rational from the point of view of the risk communicator, but the householder is capable of providing any number of reasons why their actions are logical given the circumstances in which such messages are received (Prior & Paton, 2008).

The public interpret risk messages based on their perceptions and values. Whether risk communication processes facilitate the attainment of risk management goals is a function of the perceived attributes of the information (*e.g.*, whether it is understandable) and its ability to act as a catalyst for action (*e.g.*, its meaningfulness). Irrespective of whether messages are understandable, a failure to accommodate this relationship can reduce the meaningfulness of the message and its ability to trigger action. Importantly, it is not information *per se* that determines action, but how people interpret it (*e.g.*, render it meaningful) in the context of their beliefs, attitudes, emotions, experiences and expectations (Dake, 1992; Lion, *et al.*, 2002; Marris, *et al.*, 1998; Rippl, 2002). People apply these interpretive frameworks to information about hazards, the actions proposed to mitigate their adverse consequences, and the sources that provide the information. In order to gain satisfactory outcomes, risk communicators must present information in ways that facilitate it being assimilated and acted upon (Johnston, *et al.*, 2005; Paton, 2003; Paton, *et al.*, 2005).

Results from this thesis point to the necessity of moving away from passive risk communication to active “risk engagement”, and this need is supported by a growing body of hazard preparedness literature (Cottrell, 2008; Graffy & Booth, 2008; Indian, 2008; Paton, 2008b; Paton*, et al.*, 2008a; Paton*, et al.*, 2008c; Paton & Wright, 2008; Prewitt Diaz & Dayal, 2008; Prior & Paton, 2008; Proudley, 2008). Risk engagement can yield many positive benefits both for the public and for emergency management agencies communicating about risk. Most importantly, risk engagement assists in the mutual anticipation and accommodation of the often conflicting perceptions, judgements and values held by the expert and by the public. While agency-community interaction in bushfire risk management is not new (see Gilbert, 2007 for a brief outline), these interactions are largely aimed at further information dissemination rather than strict engagement and information sharing.

For the householder, risk engagement becomes a mechanism enabling better understanding and interpretation of bushfire risk messages. Because the public do not received information passively, engaging with bushfire management agencies gives them the opportunity to question and explore risk information. They are then more capable of discussing how best to apply that information in their particular circumstances, enabling better assimilation if the information and decisions about how or if the information should be acted on. The most likely method agencies could utilise in engaging with the public are community meetings, which are often held now to provide advice prior to an imminent bushfire threat (see Tibbits & Whittaker, 2007 for example), but would also be excellent risk engagement tools. Where communities do not already interact and share information about bushfire threat or preparedness, community meetings can act as a stimulus, beginning a filtering process that brings unprepared or unconcerned residents into contact with knowledgeable, prepared and aware community members. *Chapters 4* and *5* demonstrated that a sense of community is an important resource that can help increase community bushfire preparedness levels.

For the agency, risk engagement provides a more efficacious means by which to distribute and highlight important messages concerning risk and risk mitigation activities. Current bushfire risk communication relies on the dissemination of standardised information, but *chapters 5* and *6* showed that community heterogeneity and the social construction of risk handicap such a technique. While some members of at-risk communities are capable of understanding and interpreting these messages, a large proportion of the community cannot: their perceptions and values do not align sufficiently with those of risk communicators and the risk information they receive is overlooked or misinterpreted. Engagement should include community profiling (Cottrell, 2008) as a means for fire management agencies to better understand the contexts into which their messages are delivered. Community profiling identifies the characteristics of the community or its members (newly developed/established, recently threatened/never threatened, young/old, experienced/inexperienced *etc*) and may require a different approach to engagement, or a restructuring of the risk message to ensure that it is interpreted into a communication technique that best reflects its intent. Engagement can also see fire management agencies benefiting from local knowledge about bushfire (Indian, 2008), improving their ability to deliver fire-fighting resources in a particular

geographic location with added information from the community based on tradition, experience and observation.

Perhaps the most important benefit arising from engaging rather than communicating is the re-establishment of trust between experts and the public. In risk management trust can be affected by the message or the messenger. In relation to the message, members of the public seek credible information about environmental risks and avoid information they feel is unreliable or contradicts their socio-psychological and cultural understandings of risk (Graffy & Booth, 2008). Trust in risk information is therefore reduced if risk managers emphasise the authority of expert opinion and advice over the public's framing of risk (Graffy & Booth, 2008; Indian, 2008). Under such circumstances, risk engagement can ensure information sharing and public participation in risk management. Through these activities public participants are empowered and can benefit from a demonstration of the information's transparency, which also promotes trust in expert advice (Phillips, 2006). Engagement provides a means by which the public can assess the reliability and credibility of the information they receive.

Likewise, a trusting relationship between the community and the source of risk information (the messenger) can also determine how or if risk information is used (Paton, 2007b). Both the agencies and the actual people delivering the risk message have an influence on public trust (Graffy & Booth, 2008), suggesting a socio-political function in the development or loss of trust. *Chapter 6* showed that the seasonality and geographic uncertainty of bushfire contributed to a diminution of trust between householders and bushfire management agencies. Agency predictions or seasonal warnings regarding bushfire can never be right for every household receiving this information, leading to a public belief that this information is not accurate, and the agency responsible is not credible. Bushfire is a frequently occurring natural hazard, and the more frequent a hazard, the more likely the public is to gain their own experiences, and develop perceptions about the best way to deal with the threat from a hazard. This perceived knowledge adds to their tendency to place less trust in civic agencies (Paton, 2007b, 2008b), whose information may be at odds with their own knowledge. In such circumstances, risk engagement can help to re-unite risk managers with the public in order to prevent perception and values from clouding fact and reason. It generates a better public

understanding of how and why predictions are formulated and made, and helps the public to develop closer relationships to agency representatives.

Cottrell (2008) and Indian (2008) note that risk engagement is not without drawbacks. Agencies fear the added effort may require more resources than are available, but it may be argued that allocating greater resources to engagement at the expense of fire-fighting infrastructure may be compensated by a better prepared community who require less material support. Also, at the local level where engagement would be enacted, brigades and volunteers not familiar with the objectives of engagement may view it as an accountability tool (Cottrell, 2008). Obviously the development of an engagement strategy and its application would be more time consuming than the simple distribution of risk information through brochures, the media or websites. Processes of engagement may be hijacked by vocal, or economically powerful contributors (Indian, 2008), so it is important to ensure all participants have the chance to contribute or benefit from engagement.

Risk engagement is not a bushfire preparedness panacea, and is not intended to be a substitute for traditional forms of risk communication. Risk engagement should be seen as a complementary tool the risk manager can use to engender better understanding and interpretation of the central risk communication messages, and ultimately to increase levels of household and community bushfire preparedness. Graffy and Booth (2008, p. 132) note that the convergence of scientific knowledge and public understanding should be a co-evolution "instead of [an] independent or sequential" flow of information. Co-evolution through engagement in risk management will engender greater mutual understanding of the technical and social constructions of risk and draw the disparate threat rationalities of the public and expert closer together. It will generate reciprocal recognition of the benefits of mitigating risk on one hand, and the reasoning behind inaction on the other. The nature of bushfire as a community rather than individual threat means the community should play a role in bushfire risk management. That bushfire risk communication has focused more on the messages provided rather than on the relationships between citizens and the civic agencies responsible for risk communication has been an historical shortcoming in risk management. Community involvement in risk management will help to ensure that the future development of risk

information messages will reflect both the technical and social aspects of risk, leading to a better capacity for all parties to communicate, share and act on risk information.

7.6 Summary of Implications for Bushfire Risk Communication

In examining bushfire preparedness decision-making this thesis has identified a number of key implications for improved bushfire risk communication and management. All have been described within the content of the thesis, but this is not a list of recommendations. The only recommendation I would make in light of the results of this research would be the need to include meaningful engagement in future bushfire risk management programs. Well planned and systematically conducted community engagement in bushfire risk communication will be an indispensable strategy to address the following implications.

i. Householders in Hobart and Sydney exhibited generally low levels of bushfire preparedness. Even after the introduction of new risk communication material in October 2006, and significant fires around Hobart (and Tasmania) during the 2006/07 fire season, no measurable increases in preparedness were evident. This supports other findings that traditional, passive risk communication techniques relying on awareness raising and information dissemination are ineffective.

ii. Householder's decisions about preparing are influenced by a broad range of factors, which are often not targeted by traditional risk communication techniques. The research shows that the choices to prepare or not to prepare are influenced by separate processes and ultimately dependent on householders attitudes about, or confidence in the advocated preparations. Risk communicators need to acknowledge that people choosing not to prepare require different information than people already preparing, or upgrading their preparations.

iii. Householders are unsure of what "well-prepared" actually means. Are they safe if they have mowed their lawns and cleared their gutters? Or are more significant actions necessary? Many people avoid making significant preparations if what they already do around their homes is perceived to be sufficient. They may also discount the value of significant preparations, citing the uncertainty of bushfire and the desire to avoid over-investing in an improbable occurrence (particularly as they are being

asked to make these decisions at the commencement of the season). It is important for householders to be able to identify which preparations they must do, and those that add to an already well-prepared property.

iv. Some messages contained in the current risk communication information are miscommunicated, misunderstood or misinterpreted. The policy statements regarding bushfire preparedness are clear, but how they are communicated leaves householders to question their meaning, intent and implementation. Devoting effort to correcting these issues will be critical in increasing community bushfire preparedness. For example:

    - The “stay or go” message and the “prepare regardless” advice are confused by miscommunication. Householders are told to “prepare, stay and defend, or leave early”, a message that on reading includes two (relatively straightforward) alternatives. Preparing is associated with staying to defend, but leaving early is separate. In this case householders follow the message with those choosing to stay more likely to prepare. Bushfire managers must clearly communicate the preparedness imperative, then indicate that once prepared people should plan their course of action regarding staying or going.
    - People’s confidence in preparation is often lacking, particularly advice about staying in the home during bushfire threat. This message must be supported with hard evidence that householders can apply to their own situations.

v. Sense of community (attachment to place and belonging) is an important factor influencing preparedness. Community engagement in bushfire risk management can build a sense of community in a number of ways: it builds trust, encourages information sharing within the community or between community and risk managers, generates mutual understanding of risk management and community behaviour, and draws community and agencies together around a shared purpose. Engagement makes risk communication a societal endeavour, relying on inclusion to meet policy objectives.

vi. Community variability can reduce the utility of passive mass communicated risk information. Risk managers must utilise mechanisms that can help them to identify and address community variability to increase preparedness. All at-risk householders must be able to understand and interpret risk information and be able to apply it to their own lives or lifestyles. Passive risk communication may be effective for some householders, but others require help to translate the information.

vii. Being well-prepared is as much mental as material. Successful risk education programs should include assistance to help householders develop the mental capacity to prepare – especially if the policy objective is to encourage all households to prepare regardless of their plans about staying to defend or leaving.

7.7 Research Limitations

There are several areas in which this research could have been improved in order to achieve clearer outcomes:

i. Community variability (*e.g.* strong or weak sense of community) in bushfire preparedness decision-making was a key outcome of this research. Future examinations of this type should include mechanisms to gain better descriptions of community characteristics in both the qualitative and quantitative data collection methodologies. This information would enable more accurate comparisons between important decision-making factors and the community characteristics that might play a role in their formation and/or change.

ii. The community variability identified in the research also points to the fact that qualitative data should also have been collected in Sydney. The qualitative data collection in Hobart was concluded only after no new factors influencing the interviewee's preparation decisions could be identified (termed sampling to saturation). A comparison between the qualitative data collected in 2007 with the qualitative data collected in the pilot interviews in 2006 confirmed that no important themes were overlooked in these data collection processes. Given the time-expensive nature of the transcription and analysis of the qualitative data, and the fact that no new information could be discerned with additional interviews in Hobart, it was considered unnecessary

to conduct interviews with Sydney residents. However, while nothing new in terms of bushfire decision-making may have surfaced after conducting interviews in Sydney, these interviews may have yielded useful information about the nature of the communities surveyed and why, for instance, sense of community played comparatively little role in the decision process. Qualitative information of this type may have better informed the conclusions drawn about Sydney householders, which would be of great use for both the New South Wales Fire Brigades and the Rural Fire Service.

iii. Large-scale examinations of bushfire preparedness decision-making, like that undertaken here, can be useful in gaining a broad understanding of the factors contributing to the preparation decision, and help to identify a generalised decision process. However, there is also a desperate need to examine this process on a finer scale. Smaller scale comparisons of preparedness decision-making at the level of the community, with dedicated sampling using qualitative and quantitative techniques, may be less time consuming and generate similar findings. This might also allow research to move beyond simply examining preparedness in a geographical context, instead relying on relationships between individuals as a mechanism of participant identification that would allow the assessment of preparedness from a relational rather than locational perspective.

iv. While this research involved a longitudinal component in the assessment of bushfire preparedness in Hobart residents, it was not conducted over a sufficiently long timeframe to allow an examination of the dynamic nature of preparedness at the community level. A longitudinal (seasonal) survey, conducted with corresponding respondent interviews over a period of five years would have been better suited to observe changes in preparation as a result of changes in community variability, community turnover, or the impact of risk communication or bushfire on community preparedness. A comprehensive study of this nature could also more rigorously elaborate some of the more complex processes in the bushfire preparedness decision-making process; such as the role of “stay or go” decision node on preparation and the factors that influence it; or the role of bushfire severity perceptions in determining preparation intention and action.

7.8 Possible Directions for Future Research

This thesis has developed, confirmed and tested a model describing the socio-cognitive factors influencing the decision to prepare for bushfire threat. However, to identify the practical utilities of the results of this work it is necessary to extend them beyond this document and test them in the communities where bushfire preparedness is deficient. This will provide the ultimate test of the research, but requires the assistance of willing and ready fire management agencies. Although we can already begin this process, it would benefit from some additional work. This would include:

i. At present some of the conclusions reached here are limited by the fact that qualitative data were collected in only one location. The collection of additional qualitative data from several socially and geographically distinct areas would ensure the qualitative data used to develop the model is as broadly representative as possible. A broadly representative model will reduce the likelihood that the inherent variability between at-risk communities would pose any extra difficulties in the development of future risk management programs.

ii. A specific examination of the precursors of outcome expectancy. Outcome expectancy was found to be the key predictor of the choice to prepare or not prepare. Work conducted in this thesis to progress the proposed theory of bushfire preparedness decision-making identified several important factors (agency trust and perceived bushfire severity), but these must be examined in detail, along with any other influential factors. This will ensure risk communicators targeting the promotion of positive outcome expectancy can do so in a consequential fashion.

iii. The development of a risk engagement protocol. I have intentionally avoided proposing a specific methodology for undertaking risk engagement. Identifying the best technique to undertake such work requires dedicated effort on the part of risk managers and preparedness researchers, but the community must also be a part of this process because they will be the ultimate beneficiaries. Most Australian bushfire management agencies already conduct community outreach, and it is with these

people that we must start working closely to begin to reach a methodological solution that increases community preparedness.

iv. Testing the progressed theory of bushfire preparedness proposed in *chapter 6*. Does this model improve our ability to predict or change bushfire preparedness behaviour? Householder surveys specifically examining each of the decision cues will show whether this "improved" model increases our ability to understand bushfire preparedness decision-making.

v. A specific examination of past experience. While clearly formative for many householders, the influence of past experience on bushfire preparedness is contradictory and confusing. Identifying exactly how past experience works in different socio-psychological and institutional settings should clarify its operation and contribute to improved bushfire risk communication.

vi. Improving the way we measure preparedness. Preparedness involves a diverse range of protective behaviours: some difficult, others routine. Our current measure of preparedness does not capture the difficulty or importance of different preparedness items, and I would suggest this knowledge is important when forming an accurate idea of whether a household is well-prepared, under-prepared or unprepared. Obviously such work must first determine (with the help of bushfire management agencies) what level of preparedness is needed if householders intend to stay and defend their property. This will set a benchmark for what to achieve with future bushfire education campaigns.

vii. Research dedicated to understanding how best to develop the mental preparedness of householders. This research demonstrated the importance of mental preparedness in bushfire risk management, a view acknowledged by the Australian Fire Authorities Council and anecdotally by survivors of the recent "Black Saturday" bushfires in February, 2009. However, current risk education campaigns have no focus on this aspect of preparation. Identifying how to increase mental preparedness in risk communication (without causing undue anxiety and the problems this brings), for both

well-prepared and un-prepared householders, must be an extremely important goal in future research examining bushfire risk communication.

viii. Longitudinal research that examines how community and individual dynamics influence the bushfire preparedness process. The current research was long enough only to identify that variability at the community level (*e.g.* in community structure and demographics) is an issue in understanding the factors that influence the bushfire preparedness decision-making process. A much longer term study (or five years) could understand how these changes are important by tracking them, and examining how they change the nature of community and individual preparation.

7.9 Conclusion

This research has demonstrated that the choice to prepare for bushfire is influenced by many factors. The decisions of at-risk householders do not necessarily reflect what the "expert" deems rational, but are determined by the characteristics of the individual, the community with which they associate, and their relationships with risk management agencies. So, while traditional risk communication is seen to be a key mechanism that can influence people's protective behaviour, in reality it competes with a diverse suite of decision cues: psychological, social, environmental and institutional.

In developing and examining a comprehensive social model of risk in relation to bushfire hazard, this thesis has described the socio-cognitive context in which decisions about bushfire preparedness are made. This information can help bushfire risk managers to develop education campaigns that facilitate the sustained adoption of actions that mitigate risk and reduce loss from bushfire disaster. In meeting this goal, risk communication should not be competing with the diverse decision cues, but specifically acknowledging them and working with them to generate better outcomes for agencies and householders alike. I point out the need for "risk engagement" as a means of facilitating more comprehensive hazard awareness programs that integrate risk communication and community development processes to reflect the multi-level nature of the influences on protective actions.

This thesis contributes to the literature on bushfire preparedness by developing, testing and proposing a new theory of bushfire preparedness decision-making, which itself should be

critically examined in future work. However, in undertaking this research my primary objective has been the identification of reasons why existing bushfire communication techniques have been unsuccessful, and to propose ways or mechanisms by which these techniques can be improved or changed. As such, although this work has theoretical implications for future preparedness research, it is the practical implications of this research that I hope Australian fire management agencies can utilise in the development of their future bushfire education campaigns.

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Appendix A: Bushfire Preparedness Semi-structured Interview Schedule

1. Is your property at risk from bushfire?
2. Do you prepare your property in the lead up to the bushfire season?
3. When do you normally begin to prepare?
4. Describe what you do to prepare:

a. your self/family, and

b. your property for bushfires?

for the bushfire season. What is your reasoning?

5. What factors influence these decisions about preparing?
6. What things prompt you to start preparing?
7. Do you think it's important to prepare? Why?
8. Do you think most people in you community prepare?
9. Where do you get information about preparing for bushfires?

   Prompts…
   -friends
   -family
   -neighbours/community members
   -TFS
   -media

10. Do you find that information useful to you?

Appendix B: Bushfire Preparedness Survey, 2006

Community responses to bushfire threat:
Risk perception and preparedness.

**RESEARCH BEING CONDUCTED BY THE SCHOOL OF PSYCHOLOGY
AT THE UNIVERSITY OF TASMANIA**

UTAS
FACULTY OF SCIENCE, ENGINEERING & TECHNOLOGY
School of Psychology

bushfire CRC
Bushfire Co-operative Research Centre

RESEARCH INFORMATION SHEET
Community responses to bushfire threat: risk perception and preparedness.

Tim Prior (PhD Student, University of Tasmania), Professor Douglas Paton (University of Tasmania) and Dr Alison Cottrell (James Cook University) would like to invite you to participate in a research project that is being undertaken by Tim Prior to fulfil the requirements for a Doctorate in Psychology.

This research will assess factors that influence how and why people make decisions about preparing or not preparing for bushfires. Preparing is seen as an important factor in assisting communities to safeguard their wellbeing and to minimise disruption (e.g., damage to homes, loss of work) should a bushfire affect them. This research will be undertaken to assess the personal and community factors that influence levels of preparedness. The enclosed questionnaire includes questions that have been identified as influencing the effectiveness of public information campaigns designed to enhance preparedness for natural hazard effects.

This research will be conducted over the coming bushfire season and continue during the following season (2007/08). The outcomes of this research will assist the development of improved risk communication techniques to be used by fire services Australia-wide.

To collect this information, questionnaires are being distributed to 1500 households around Hobart. We would like to take this opportunity to invite you to participate in this survey. Your participation will help ensure that future public bushfire hazard information campaigns can be targeted to meet the needs of your community. One-on-one telephone interviews will also be conducted with those people who are interested in participating further.

Updates summarising the findings from this survey will be made available on the University of Tasmania, School of Psychology (http://fcms.its.utas.edu.au/scieng/psychol/index.asp) web pages. We will also report outcomes in the local print media and radio. The data will be stored for five years in a locked cabinet, and all raw data will be destroyed at the end of the five-year period.

Your participation in the questionnaire and telephone surveys is entirely voluntary, and you may elect to refuse to answer any question on the questionnaire. The questionnaire does not ask identifying information and the researchers will not know your identity. We have asked you to provide your first name only if you choose to take part in the telephone survey component of this research. None of your responses from the questionnaire or telephone survey will be identifiable to you in any research output.

Should you wish any additional information regarding this research, please do not hesitate to contact any of the research team. Please contact Tim Prior (03 6226 7462 or priort@postoffice.utas.edu.au) or Douglas Paton (Douglas.Paton@utas.edu.au).

This questionnaire is not intended to inform the householder about how to prepare for the bushfire season. For information on preparing your property, please contact the Tasmania Fire Service on (toll free) 1800 000 699 or visit their website at www.fire.tas.gov.au.

This research project has received ethical approval from the Human Research Ethics Committee (Tasmania). Should you have any concerns of an ethical nature or complaints regarding the manner in which this research is conducted, please do not hesitate to contact the Ethics Officer for the social sciences at the University of Tasmania:

Ethics Officer - Social Sciences: Marilyn Knott (03) 6226 2763
Marilyn.Knott@utas.edu.au
http://www.research.utas.edu.au/

Your return of the enclosed questionnaire will be taken as an indication of you having read the information sheet and of your agreement to participate in this study.

I would be grateful if the oldest person in your household could complete the questionnaire and return it in the reply-paid envelope within two weeks of you receiving it. Thank you.

To compliment the questionnaire I will be conducting one-to-one telephone interviews. If you are interested in being interviewed, please provide your name, a contact number and sign the last page of the questionnaire. Again, your involvement in these interviews is completely voluntary and any information you provide will not be identifiable in any research output. Your signature will be taken as an indication that you are willing to be contacted for the interview.

Please feel free to contact any of the above mentioned researchers should you require any further information or gain clarification about any issue relating to this research and its objectives.

Thanking you in advance for your assistance in this project.

Tim Prior.

Questionnaire:

1. **How long have you lived in _____ (name of your suburb) _____ years**

2. **How long have you lived in your present house _____years?**

3. **Do you own or rent your home? (please circle one) OWN/RENT**

4. **Please indicate how much you: (please circle one per line)**

	Once a week or more	Once a month	A few times a year	Rarely	Never
Think about bushfires?	5	4	3	2	1
Talk about bushfires?	5	4	3	2	1

What sort of things do you think and talk about?

_____

_____

_____

_____

_____

_

5. **Please indicate the extent to which you agree or disagree with each of the following statements: (please circle one per line)**

		Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Bushfires could pose a threat to **your** personal safety		5	4	3	2	1
Bushfires could pose a threat to **your** daily life (e.g., work, leisure)		5	4	3	2	1
Bushfires could pose a threat to **your** property.		5	4	3	2	1
Bushfires could pose a threat to **your** community.		5	4	3	2	1

6. The following questions relate to <u>other</u> members of you community. Please indicate the extent to which you agree or disagree with each of the following statements:

		Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Bushfires could pose a threat to the personal safety of most of the people who live in your community		5	4	3	2	1
Bushfires could pose a threat to the daily activities (e.g. work or leisure) of most of the people who live in your community		5	4	3	2	1
Bushfires could pose a threat to the houses or properties of most of the people who live in your community		5	4	3	2	1

7. Please indicate the extent to which you agree or disagree with each of the following statements: (please circle one per line)

		Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Bushfires occur infrequently		5	4	3	2	1
Bushfires are not likely to occur during this summer		5	4	3	2	1
The authorities can predict the bad bushfire seasons		5	4	3	2	1
Bushfires occur every year		5	4	3	2	1
Bushfire is a natural part of the Australian environment		5	4	3	2	1

8. Within which of the following times frames do you think bushfire is likely to affect you in the future? (Please circle one).

1 in the next three months

2 in the next 3 to 12 months

3 in the next 1 to 5 years

4 longer than 5 years

9. Have you experienced a bushfire? (Please circle) **1 YES** **2 NO**

If yes:

a. What year(s)? _____

b. Did you experience damage or loss? (i.e. requiring any repairs or insurance claims) **1 YES** **2 NO**

c. Were you injured? **1 YES** **2 NO**

If no, have these people experienced fire:

a. Family **1 YES** **2 NO**

b. Friends **1 YES** **2 NO**

C. Other members of the community **1 YES** **2 NO**

10. Please indicate the extent to which you agree or disagree with each of the following statements: (please circle one per line)

		Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Bushfires are too destructive to bother preparing for		5	4	3	2	1
A serious bushfire is unlikely to occur during my lifetime		5	4	3	2	1
Preparing for bushfires will significantly reduce damage to my home should fire occur		5	4	3	2	1
Preparing for bushfires will improve my everyday living conditions		5	4	3	2	1
Preparing for bushfires will improve the value of my house/ property		5	4	3	2	1
Preparing for bushfires will significantly improve my ability to deal with disruption to family/ community life following a fire		5	4	3	2	1
Preparing for bushfires is inconvenient for me		5	4	3	2	1
I find it difficult to prepare for bushfires		5	4	3	2	1

11. With regard to burning off, please indicate the extent to which you agree or disagree with the following statements: (please circle one only)

12. In regard to responsibility for bushfire preparedness, please indicate the extent to which you agree or disagree with each of the following statements: (please circle one per line)

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Burning-off can be accomplished in a controlled manner	5	4	3	2	1
Burning-off should be conducted regularly to reduce the chance of a large bushfire	5	4	3	2	1
Burning-off is unnecessary	5	4	3	2	1

		Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
I feel responsible for preparing for major bushfires		5	4	3	2	1
It is the responsibility of Local, State or Federal agencies to prepare for bushfires		5	4	3	2	1
I can't be expected to prepare for bushfires		5	4	3	2	1
It is the responsibility of government agencies to <u>ensure</u> I am prepared for bushfires		5	4	3	2	1

13. In regard to the issues and problems you face during <u>your</u> *everyday* life, please indicate the extent to which you agree or disagree with the following statements:

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
I have considerable control over what happens in my life	5	4	3	2	1
I can solve most of my problems by myself	5	4	3	2	1
What happens to me in the future mostly depends on me	5	4	3	2	1
I can do a lot to change many of the important things in my life	5	4	3	2	1
I can do just about anything if I really set my mind on it	5	4	3	2	1
I really feel helpless in dealing with the problems of life	5	4	3	2	1

14. In regard to dealing with problems in <u>your</u> everyday life, please indicate on a scale from 1 (I usually don't do this at all) to 4 (I usually do this a lot) how much of each of the following you do: (please circle one per line)

	I usually don't do this at all		I usually do this a lot

I try to come up with a strategy about what to do	1	2	3	4
I make a plan of action	1	2	3	4
I think hard about what steps to take	1	2	3	4
I think about how I might best handle the problem	1	2	3	4

15. In the next month or so, do you intend to: (please circle one per line)

	No	Possibly	Definitely
Check your level of preparedness for bushfires	1	2	3
Increase your level of preparedness for bushfires	1	2	3
Become involved with a local group to discuss how to reduce damage or losses from bushfires	1	2	3
Seek information on bushfire risk	1	2	3
Seek information on things to do to prepare	1	2	3

If you intend to seek information on bushfire risk and/or preparedness, please list two sources/organisations you intend to contact:

a. _____

b. _____

16. Please rate (from 1 = not at all prepared to 5 = very prepared) the extent to which <u>you perceive each of the following</u> is prepared to deal with a bushfire: (please circle one per line)

	Not at all prepared				**Very prepared**
How prepared do you think you are for major bushfires?	1	2	3	4	5
How well-prepared do you think other members of your community are for major bushfires	1	2	3	4	5

17. Is there an active volunteer bushfire brigade in your community? YES/NO

18. Please rate (from 1 = heavily involved to 5 = not at all involved) the level to which <u>you perceive each of the following</u> are involved in volunteer bushfire brigades: (please circle one per line)

	Heavily involved				**Not at all involved**
How much you volunteer?	1	2	3	4	5
How much other members of your community volunteer?	1	2	3	4	5
How much people outside your community volunteer?	1	2	3	4	5

19. In regard to living in this *community*, please indicate the extent to which <u>you</u> agree or disagree with the following statements:

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
I feel like I belong in this community	5	4	3	2	1
I believe my neighbours would help me in an emergency	5	4	3	2	1
Even if I had the opportunity I would not move out of this community	5	4	3	2	1
I feel loyal to the people in my community	5	4	3	2	1
I often have friends from the neighbourhood over to see me	5	4	3	2	1
I plan to stay a resident of this suburb for a while to come	5	4	3	2	1

20. The following activities help minimise disruption to a community if a bushfire occurs. Please record whether the following currently apply to <u>your community</u> (circle one on each line)

	YES	**NO**	**Don't know**
Does the neighbourhood have a bushfire response plan?	1	2	3
Does the neighbourhood have a fire protection plan?	1	2	3
Is there a local group to discuss how to reduce damage or losses from bushfires?	1	2	3
Have you been involved in meetings on bushfire preparedness			
a. At a school?	1	2	
b. With the local community?	1	2	
Have you discussed the need for bushfire preparedness with			
c. Your Neighbours?	1	2	
d. Official agencies?	1	2	

21. With regard to your general feelings about living in this *community*, please indicate the extent to which <u>you</u> agree or disagree with each of the following statements (please circle one per line)

		Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
We can greatly improve services in the community even when not everyone agrees		5	4	3	2	1

We can improve the quality of life in the community, even when resources are scarce		5	4	3	2	1
Our community can co-operate in the face of difficulties to improve the quality of community facilities		5	4	3	2	1
The community can present a united vision to outsiders		5	4	3	2	1
The people in this community can work together even when it requires more effort than normal		5	4	3	2	1
We can resolve crises in this community without any negative after effects		5	4	3	2	1
Our community can improve services for citizens without help from the council or other government agencies		5	4	3	2	1
The members of this community talk about issues they are interested in		5	4	3	2	1
How this community thinks about problems determines what we do about them		5	4	3	2	1

22. With regard to <u>your</u> general feelings about living in this *community*, please indicate the extent to which you agree or disagree with the following statements:

		Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
I trust my local council to respond to meet the needs of its residents		5	4	3	2	1
I trust my community leaders		5	4	3	2	1
I trust my local council to do what is necessary should a bushfire occur		5	4	3	2	1
I have confidence in the law to protect and maintain order in my community		5	4	3	2	1
I trust the media (newspapers, TV, radio) to report fairly		5	4	3	2	1

23. What is the likelihood that the following people would view a decision prepare favourably? (please circle one per line)

	Very likely				**Very unlikely**
Family	5	4	3	2	1
Friends	5	4	3	2	1
Work Colleagues	5	4	3	2	1
General community	5	4	3	2	1

24. How likely is it that the following people would think that something could be done to prevent injury and damage in the event of a bushfire? (please circle one per line)

	Very likely				**Very unlikely**
Family	5	4	3	2	1
Friends	5	4	3	2	1
Work colleagues	5	4	3	2	1
General community	5	4	3	2	1

25. How strongly do you feel the need to do what the following people think you should do? (please circle one per line)

	Very strongly				**Not at all strongly**
Family	5	4	3	2	1
Friends	5	4	3	2	1
Work colleagues	5	4	3	2	1
General community	5	4	3	2	1

26. Would you agree that the opinions of the following people are important to you when deciding on a particular course of action? (please circle one per line)

	Strongly Agree				**Strongly disagree**
Family	5	4	3	2	1
Friends	5	4	3	2	1
Work colleagues	5	4	3	2	1
General community	5	4	3	2	1

27. Would you agree that the following people would view your decision to prepare unfavourably? (please circle one per line)

	Strongly disagree				**Strongly agree**
Family	1	2	3	4	5
Friends	1	2	3	4	5
Work colleagues	1	2	3	4	5
General community	1	2	3	4	5

28. How likely would it be that you would not prepare if the following people viewed preparations unfavourably? (please circle one per line)

	Very unlikely				**Very likely**
Family	1	2	3	4	5
Friends	1	2	3	4	5
Work colleagues	1	2	3	4	5
General community	1	2	3	4	5

29. Please read each of the following statements and indicate the extent to which <u>you</u> agree or disagree with each: (please circle one per line)

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
There may be bushfires, but they won't be that bad	5	4	3	2	1
Australian plants and animals are adapted to fire	5	4	3	2	1
The location of the bushfires will be far away from here and have little impact on us	5	4	3	2	1
The likelihood that major bushfires will occur here has been greatly exaggerated	5	4	3	2	1
Fire is important to cleanse the bush of weeds	5	4	3	2	1
Wildfires have greater impacts on plants and animals than hazard reduction burns	5	4	3	2	1
I have been fine during the bushfires we have had and I will be fine in the next one too	5	4	3	2	1
Frequent burning has unacceptable environmental impact	5	4	3	2	1
Wildfires are unnatural	5	4	3	2	1
Australian plants and animals need fire to survive	5	4	3	2	1

30. With regard to resources you need to prepare your property, please indicate the extent to which you agree or disagree with each statement: (circle one per line)

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
There might be a lot of information around about preparing, but it's hard to find	5	4	3	2	1
I think fire services should provide more resources to assist my preparation	5	4	3	2	1
I know what resources I need to prepare	5	4	3	2	1
I have the resources that I need to prepare	5	4	3	2	1

31. The following are things that can be done to minimise damage and disruption in a bushfire emergency. In regard to *your* household, please record whether you <u>currently</u> do each item. (please circle one per line)

	Have done this	May do this	Will not do this
I have considered the risk of a major bushfire when deciding to live in the house that I now live in.	**3**	**2**	**1**
I keep my property tidy to reduce the threat of damage by bushfire	**3**	**2**	**1**
I keep my gutters free of leaf litter	**3**	**2**	**1**
I keep shrubs and trees from growing against the house	**3**	**2**	**1**
I keep firewood stacked away from the house	**3**	**2**	**1**
I clear up dry litter from the ground	**3**	**2**	**1**
I have a basic understanding of how a bushfire attacks	**3**	**2**	**1**
I have assessed the bushfire risk to my house, such as identifying potential fire risks like timber decking	**3**	**2**	**1**
I have a household bushfire emergency plan	**3**	**2**	**1**
I have advised my family and friends of my bushfire emergency plan	**3**	**2**	**1**
I have decided who in my household should stay, and who should leave for safety if a bushfire threatens	**3**	**2**	**1**
My plan covers where my family should meet during a bushfire emergency	**3**	**2**	**1**
I have decided what documents and personal effects I would take with me if I left the house, and have stored them where I can easily reach them in an emergency	**3**	**2**	**1**
I have decided what to do with my pets and other animals should a bushfire threaten my property	**3**	**2**	**1**
I understand the impact that a power failure would have on my plans, e.g. my automatic garage door will not open	**3**	**2**	**1**
I have checked that I have adequate home and/or contents insurance	**3**	**2**	**1**
I have an emergency kit containing:			
a. torches	**3**	**2**	**1**
b. spare batteries for torch	**3**	**2**	**1**
c. candles	**3**	**2**	**1**
d. matches/lighter	**3**	**2**	**1**
e. AM/FM battery powered radio	**3**	**2**	**1**
f. Spare batteries for radio	**3**	**2**	**1**
g. First aid kit	**3**	**2**	**1**
h. Essential medication	**3**	**2**	**1**
i. Fire extinguisher	**3**	**2**	**1**
j. Fire blankets	**3**	**2**	**1**
k. Protective clothing (shoes, natural fibre clothes etc)	**3**	**2**	**1**
l. Bottled drinking water	**3**	**2**	**1**

	Have done this	May do this	Will not do this
m. Long-life energy food	**3**	**2**	**1**
n. Emergency contact details	**3**	**2**	**1**

o. List and location of valuables	**3**	**2**	**1**
I check the contents/operation of my emergency kit before the fire season, and monthly during the fire season	**3**	**2**	**1**
I have long hoses that can reach all of my house and garden	**3**	**2**	**1**
I have metal buckets for fire-fighting	**3**	**2**	**1**
I have ladders that are long enough to allow me to check the roof cavity and eaves	**3**	**2**	**1**
I have metal rakes and shovels and mops to put out sparks	**3**	**2**	**1**
I have good access to water supplies	**3**	**2**	**1**
I am aware of alternative water sources such as ponds and pools	**3**	**2**	**1**
I have planned at least two alternative evacuation routes	**3**	**2**	**1**
I keep my grass mown short	**3**	**2**	**1**
I have cleared undergrowth from fences	**3**	**2**	**1**
I have checked that all roof coverings fit tightly so that there are no openings through which sparks might get blown	**3**	**2**	**1**
I have replaced missing or damaged roof tiles	**3**	**2**	**1**
I have ensured that there are no structures built of combustible materials that are attached to my house	**3**	**2**	**1**
I have screened my vents and eaves with metal flywire	**3**	**2**	**1**
I have planned what I will use to block my gutters	**3**	**2**	**1**
I regularly prune and clear dead material from under shrubs and trees	**3**	**2**	**1**
I have removed tree branches that overhang my house	**3**	**2**	**1**
I have screened the under-floor spaces of my house with metal flywire	**3**	**2**	**1**
I have fitted shutters or metal screens to my windows	**3**	**2**	**1**
I have removed mulch from close to my house	**3**	**2**	**1**
I keep the area around my house clear with paving, mowed lawn or low ground cover	**3**	**2**	**1**
I am aware of the sorts of weather that can produce bad fire days and keep an eye on weather forecasts	**3**	**2**	**1**
I try to keep aware of fire danger ratings and total fire bans	**3**	**2**	**1**
I know what I will do if a fire front is approaching	**3**	**2**	**1**

32. To what extent might each of the following prevent you from preparing for bushfires. Please rate the impact of each item from 1 (not at all) to 5 (a great deal).

	Not at all				**A great deal**
The cost	1	2	3	4	5
The skill or knowledge required	1	2	3	4	5
Time to do them	1	2	3	4	5
Physical ability	1	2	3	4	5
There are other things on my mind	1	2	3	4	5
A need to co-operate with others	1	2	3	4	5

33. In regards to your general feelings about the bush-land surrounding *your suburb*, please indicate the extent to which <u>you</u> agree or disagree with each of the following statements.

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Living close to the bush means a lot to me	5	4	3	2	1
I think the local bush-land is important habitat for native plants and animals	5	4	3	2	1
I think more work should be done for fire protection in my suburb irrespective of impact on native plants and animals	5	4	3	2	1

34. How often do you visit the bush-land near you (please circle only one)

1 One or more times a week
2 Once a fortnight
3 Once a month
4 Less than once a month
5 Infrequently
6 Never

35. Thinking about what you have heard about bushfire hazards in Tasmania, how consistent was this information? (Please circle only one)

1 I have not heard anything
2 Consistent
3 Fairly consistent
4 Unsure
5 Fairly inconsistent
6 Inconsistent

36. Thinking about what you've heard about bushfires in media from Tasmania and the mainland, please rate (from 1 = very reliable to 5 = not at all reliable) how reliable the following forms of media are when discussing bushfires: (please circle one per line)

	Very reliable				**Not at all reliable**
Newspapers?	1	2	3	4	5
Television?	1	2	3	4	5
Radio?	1	2	3	4	5
Other (Specify: _____)	1	2	3	4	5

37. How often does media reporting encourage you to prepare your home for bushfire? (please circle one only)

1 I haven't heard anything
2 Never
3 Sometimes
4 Unsure
5 Mostly
6 Always

38. How often do you find information from media reports about bushfires useful in helping you to prepare? (please circle one)

1 I haven't heard anything
2 Never
3 Sometimes
4 Unsure
5 Mostly
6 Always

Age: _____

Gender: 1 Male 2 Female

Do you speak a language other than English at home? **YES/NO**

If yes, please specify_____

Do any members of your household have reduced mobility for any reason? **YES/NO**

In which of the following categories is your yearly household income (before tax):

(Please circle only one)

1 $25,000 or less

2 $26,000 – 44,000

3 $45,000 – 65,000

4 $66,000 – 84,000

5 $85,000 and over

Date you completed this survey_____

(Please complete within 2 weeks of receipt and return in the free post envelope provided)

Thank you for your participation

Community responses to bushfire threat: Risk perception and preparedness.

Telephone Interview Consent Form

1. I have read and understand the information sheet for this study (see page 2).
2. The reasons for the study, what it will involve, and the possible effects of the study have been explained to me.
3. I understand that an interview will be conducted with me to obtain an understanding of the factors that influence me to prepare or not prepare for bushfires. It is my understanding that the interview will take approximately 30 minutes to complete.
4. I agree that information gathered for the study may be published, provided that I cannot be identified as a participant. I also understand that while the interview will be recorded using a digital voice recorder, my anonymity will be assured, as it is not necessary to record my name or any other identifying information.
5. I understand that all research data will be stored securely at the School of Psychology, University of Tasmania (Hobart) for a period of five years, and that the recordings and data will be destroyed after five years.
6. I understand that no psychological distress or inconvenience beyond the normal experience of everyday life is expected.
7. Any questions that I have asked have been answered to my satisfaction.
8. I agree to participate in the interview session and understand that my participation is voluntary and that I may withdraw at any time without being penalised or disadvantaged in any way.

First name of participant_____(please print)

Signature of participant_____ Date:_____

Contact number_____

Preferred time to call (date/time) _____

Name of investigator_____

Signature of investigator_____

Date_____

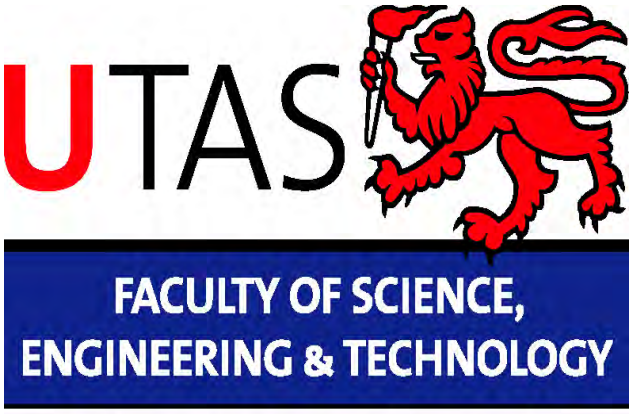
NB: Between 50 and 70 telephone interviews will be conducted during the 2006/07 bushfire season. If you indicate you'd like to be contacted, but are not, this may be due to the large number of people interested in being interviewed.

Thank you very much for completing this survey.

Please remember to return this questionnaire in the reply-paid envelope within two weeks of receiving it.

If you need any more information on the questionnaire, or have any questions regarding the research, please don't hesitate to contact me:

Tim Prior
Ph: 6226 7462
Email: priort@postoffice.utas.edu.au



School of Psychology

http://fcms.its.utas.edu.au/scieng/psychol/

http://www.bushfirecrc.com

For information about preparing your property for the bushfire season, contact the Tasmania Fire Service
Toll free - 1800 000 699
www.fire.tas.gov.au

Appendix C: Bushfire Preparedness Survey, 2007

Community responses to bushfire threat:
Risk perception and preparedness.

RESEARCH BEING CONDUCTED BY THE SCHOOL OF PSYCHOLOGY AT THE UNIVERSITY OF TASMANIA

2007/08 Bushfire season

UTAS
FACULTY OF SCIENCE, ENGINEERING & TECHNOLOGY
School of Psychology

bushfire CRC
Bushfire Co-operative Research Centre

RESEARCH INFORMATION SHEET
Community responses to bushfire threat: risk perception and preparedness.

Tim Prior (PhD Student, University of Tasmania), Professor Douglas Paton (University of Tasmania) and Dr Alison Cottrell (James Cook University) would like to invite you to participate in a research project that is being undertaken by Tim Prior to fulfil the requirements for a Doctorate in Psychology.

This research will assess factors that influence how and why people make decisions about preparing or not preparing for bushfires. Preparing is seen as an important factor in assisting communities to safeguard their wellbeing and to minimise disruption (e.g. damage to homes, loss of work) should a bushfire affect them. This research will be undertaken to assess the personal and community factors that influence levels of preparedness. The enclosed questionnaire includes questions that have been identified during research from the 2006/07 bushfire season, which explore a wide range of factors that influence preparedness and the effectiveness of public information campaigns designed to enhance preparedness for bushfires.

This research will be conducted over the coming bushfire season. The outcomes of this research will assist the development of improved risk communication techniques to be used by fire services Australia-wide.

Questionnaires are being distributed to households around Hobart and Sydney. We would like to take this opportunity to invite you to participate in this survey. Your participation will help ensure that future public bushfire hazard information campaigns can be targeted to meet the needs of your community. One-on-one telephone interviews will also be conducted with those people who are interested in participating further.

Updates summarising the findings from this survey will be made available on the University of Tasmania, School of Psychology (http://fcms.its.utas.edu.au/scieng/psychol/index.asp) web pages. We will also report outcomes in the local print media and radio. The data will be stored for five years in a locked cabinet, and all raw data will be destroyed at the end of the five-year period.

Your participation in the questionnaire and telephone surveys is entirely voluntary, and you may elect to refuse to answer any question on the questionnaire. The questionnaire does not ask identifying information and the researchers will not know your identity. We have asked you to provide your first name only if you choose to take part in the telephone survey component of this research. **None of your responses from the questionnaire or telephone survey will be identifiable to you in any research output**.

Should you seek any additional information regarding this research, please do not hesitate to contact Tim Prior (03 6226 7462 or timothy.prior@utas.edu.au) or Douglas Paton (Douglas.Paton@utas.edu.au).

This questionnaire is not intended to inform the householder about how to prepare for the bushfire season. For information on preparing your property, please contact either: the Tasmania Fire Service on 1800 000 699 or visit their website at www.fire.tas.gov.au; or the NSW Rural Fire Service on 1800 679 737 or visit their website at www.bushfire.nsw.gov.au.

This research project has received ethical approval from the Human Research Ethics Committee (Tasmania). Should you have any concerns of an ethical nature or complaints regarding the manner in which this research is conducted, please do not hesitate to contact the Ethics Officer for the social sciences at the University of Tasmania:

Ethics Officer - Social Sciences:	Marilyn Knott (03) 6226 2763 Marilyn.Knott@utas.edu.au http://www.research.utas.edu.au/

I will take the return of the enclosed questionnaire as an indication of you having read the information sheet and of your agreement to participate in this study.

To compliment the questionnaire I will be conducting one-to-one telephone interviews. If you are interested in being interviewed, please provide your name, a contact number and sign the last page of the questionnaire. Again, your involvement in these interviews is completely voluntary and any information you provide will not be identifiable in any research output. Your signature and provision of your telephone number will be taken as an indication that you are willing to be contacted for the interview.

Please feel free to contact any of the above mentioned researchers should you require any further information or gain clarification about any issue relating to this research and its objectives.

Thanking you in advance for your help in this project.

Tim Prior.

I would be grateful if the oldest person in your household could complete the questionnaire and return it in the reply-paid envelope within two weeks of you receiving it. Thank you.

Questionnaire:

1. **How long have you lived in _____ (name of your suburb) _____ years**

2. **How long have you lived in your present house _____years?**

3. **Do you own or rent your home? (please circle one) OWN/RENT**

4. **Please indicate how much you: (please circle one per line)**

	Once a week or more	Once a month	A few times a year	Rarely	Never
Think about bushfires?	5	4	3	2	1
Talk about bushfires?	5	4	3	2	1

What sort of things do you think and talk about?

_____

_____

_____

_____

_____

5. **Please indicate the extent to which you agree or disagree with each of the following statements: (please circle one per line)**

		Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Bushfires could pose a threat to **your** personal safety		5	4	3	2	1
Bushfires could pose a threat to **your** daily life (e.g., work, leisure)		5	4	3	2	1
Bushfires could pose a threat to **your** property.		5	4	3	2	1
Bushfires could pose a threat to **your** community.		5	4	3	2	1

6. The following questions relate to <u>other</u> members of your community. Please indicate the extent to which you agree or disagree with each of the following statements:

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Bushfires could pose a threat to the personal safety of most of the people who live in your community	5	4	3	2	1
Bushfires could pose a threat to the daily activities (e.g. work or leisure) of most of the people who live in your community	5	4	3	2	1
Bushfires could pose a threat to the houses or properties of most of the people who live in your community	5	4	3	2	1

7. Please indicate the extent to which you agree or disagree with each of the following statements: (please circle one per line)

		Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Bushfires occur infrequently		5	4	3	2	1
Bushfires are not likely to occur during this summer		5	4	3	2	1
The authorities can predict the bad bushfire seasons		5	4	3	2	1
Bushfires occur every year		5	4	3	2	1
Bushfire is a natural part of the Australian environment		5	4	3	2	1

8. Within which of the following time frames do you think bushfire is likely to affect you in the future? (Please circle one).

1 in the next three months

2 in the next 3 to 6 months

3 in the next 6 months to 3 years

4 longer than 3 years

9. Have you experienced a bushfire? (Please circle) **1 YES** **2 NO**

If yes:

d. What year(s)? _____

Have these people experienced fire:

d. Family? **1 YES** **2 NO**

e. Friends? **1 YES** **2 NO**

F. Other members of your community? **1 YES** **2 NO**

10. Please indicate the extent to which you agree or disagree with each of the following statements: (please circle one per line)

		Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Bushfires are too destructive to bother preparing for		5	4	3	2	1
A serious bushfire is unlikely to occur during my lifetime		5	4	3	2	1
Preparing for bushfires will significantly reduce damage to my home should fire occur		5	4	3	2	1
Preparing for bushfires will improve my everyday living conditions		5	4	3	2	1
Preparing for bushfires will improve the value of my house/ property		5	4	3	2	1
Preparing for bushfires will significantly improve my ability to deal with disruption to family/ community life following a fire		5	4	3	2	1
Preparing for bushfires is inconvenient for me		5	4	3	2	1
I find it difficult to prepare for bushfires		5	4	3	2	1

11. In regards to your general feelings about the bush-land surrounding <u>your</u> suburb, please indicate the extent to which <u>you</u> agree or disagree with each of the following statements.

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Living close to the bush means a lot to me	5	4	3	2	1
I think the local bush-land is important habitat for native plants and animals	5	4	3	2	1
I think more work should be done for fire protection in my suburb irrespective of impact on native plants and animals	5	4	3	2	1

12. In regard to responsibility for bushfire preparedness, please indicate the extent to which you agree or disagree with each of the following statements: (please circle one per line)

		Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

I feel responsible for preparing for bushfires		5	4	3	2	1
It is the responsibility of local, state or federal agencies to prepare for bushfires		5	4	3	2	1
I can't be expected to prepare for bushfires		5	4	3	2	1
It is the responsibility of government agencies to ensure I am prepared for bushfires		5	4	3	2	1

13. In regard to the issues and problems you face during <u>your</u> everyday life, please indicate the extent to which you agree or disagree with the following statements:

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
I have considerable control over what happens in my life	5	4	3	2	1
I can solve most of my problems by myself	5	4	3	2	1
What happens to me in the future mostly depends on me	5	4	3	2	1
I can do a lot to change many of the important things in my life	5	4	3	2	1
I can do just about anything if I really set my mind on it	5	4	3	2	1
I really feel helpless in dealing with the problems of life	5	4	3	2	1

14. In regard to dealing with problems in <u>your</u> everyday life, please indicate on a scale from 1 (I usually don't do this at all) to 4 (I usually do this a lot) how much of each of the following you do: (please circle one per line)

	I usually don't do this at all			I usually do this a lot
I try to come up with a strategy about what to do	1	2	3	4
I make a plan of action	1	2	3	4
I think hard about what steps to take	1	2	3	4
I think about how I might best handle the problem	1	2	3	4

15. In the next month or so, do you intend to: (please circle one per line)

	No	Possibly	Definitely
Check your level of preparedness for bushfires	1	2	3
Increase your level of preparedness for bushfires	1	2	3
Become involved with a local group to discuss how to reduce damage or losses from bushfires	1	2	3
Seek information on bushfire risk	1	2	3

Seek information on things to do to prepare	1	2	3

I

f you intend to seek information on bushfire risk and/or preparedness, please list two sources/organisations you intend to contact:

a. _____
b. _____

16. Please rate (from 1 = not at all prepared to 5 = very prepared) the extent to which <u>you perceive each of the following</u> is prepared to deal with a bushfire: (please circle one per line)

	Not at all prepared				**Very prepared**
How prepared do you think you are for major bushfires?	1	2	3	4	5
How well-prepared do you think other members of your community are for major bushfires	1	2	3	4	5

17. In regard to living in this <u>community</u>, please indicate the extent to which <u>you</u> agree or disagree with the following statements:

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
I feel like I belong in this community	5	4	3	2	1
I believe my neighbours would help me in an emergency	5	4	3	2	1
Even if I had the opportunity I would not move out of this community	5	4	3	2	1
I feel loyal to the people in my community	5	4	3	2	1
I often have friends from the neighbourhood over to see me	5	4	3	2	1
I plan to stay a resident of this suburb for a while to come	5	4	3	2	1

18. The following activities help minimise disruption to a community if a bushfire occurs. Please record whether the following currently apply to <u>your community</u>: (circle one on each line)

	YES	**NO**	**Don't know**
Does the neighbourhood have a bushfire response plan?	1	2	3
Does the neighbourhood have a bushfire protection plan?	1	2	3
Is there a local group to discuss how to reduce damage or losses from bushfires?	1	2	3
Have you been involved in meetings on bushfire preparedness?	1	2	
Have you discussed the need for bushfire preparedness with			
a. Your neighbours	1	2	
b. Representatives from fire management agencies	1	2	

19. With regard to your general feelings about living in this community, please indicate the extent to which <u>you</u> agree or disagree with each of the following statements: (please circle one per line)

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree

We can greatly improve services in the community even when not everyone agrees	5	4	3	2	1
We can improve the quality of life in the community, even when resources are scarce	5	4	3	2	1
Our community can co-operate in the face of difficulties to improve the quality of community facilities	5	4	3	2	1
The community can present a united vision to outsiders	5	4	3	2	1
The people in this community can work together even when it requires more effort than normal	5	4	3	2	1
We can resolve crises in this community without any negative after effects	5	4	3	2	1
Our community can improve services for citizens without help from the council or other government agencies	5	4	3	2	1
The members of this community talk about issues they are interested in	5	4	3	2	1
How this community thinks about problems determines what we do about them	5	4	3	2	1

20. With regard to <u>your</u> general feelings about living in this community, please indicate the extent to which you agree or disagree with the following statements:

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
I trust my local council to respond to meet the needs of its residents	5	4	3	2	1
I trust my community leaders	5	4	3	2	1
I trust my local council to do what is necessary should a bushfire occur	5	4	3	2	1
I have confidence in the law to protect and maintain order in my community	5	4	3	2	1
I trust the media (newspapers, TV, radio) to report fairly	5	4	3	2	1

21. In regard to what happens in the <u>wider community</u>, in general, to what extent do you:

	Always	A great deal	Sometimes	Not very much	Not at all
Feel that you can influence what happens in your community	5	4	3	2	1
Feel that you see positive results from participating in community activities	5	4	3	2	1
Feel that you play an active part in keeping this community going	5	4	3	2	1
Think that elected representatives seriously	5	4	3	2	1

consider your opinions					

22. With regard to resources you need to prepare your property, please indicate the extent to which you agree or disagree with each statement: (circle one per line)

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
There might be a lot of information around about preparing, but it's hard to find	5	4	3	2	1
I think fire services should provide more resources to assist my preparation	5	4	3	2	1
I know what resources I need to prepare	5	4	3	2	1
I have the resources that I need to prepare	5	4	3	2	1

23. Please indicate the likelihood that you have anticipated what actions are necessary to minimise bushfire damage:

	I will do this	I may do this	I will not do this
Find out exactly how to prepare for bushfires	3	2	1
Identify specific areas of my house that need to be protected against bushfires	3	2	1
Begin preparing for bushfires by a particular date	3	2	1

24. Please write below precisely when, where and how you will plan to initiate bushfire preparation procedures:

_____

_____

_____

_____

_____

25. To what extent might each of the following prevent you from preparing for bushfires. Please rate the impact of each item from 1 (not at all) to 5 (a great deal):

	Not at all				A great deal
The cost	**1**	2	3	4	5
The skill or knowledge required	**1**	2	3	4	5
Time to do them	**1**	2	3	4	5
Physical ability	**1**	2	3	4	5
There are other things on my mind	**1**	2	3	4	5
To do them I need to co-operate with others	**1**	2	3	4	5

26. In regard to participating in activities within the <u>wider community</u>, please describe how often you undertake each of the following.

	Often	Sometimes	Rarely	Never
I have worked with others on something to improve community life	4	3	2	1
I participate in local activities or events (e.g., festivals, fetes, fairs)	4	3	2	1
I have contributed money, food or clothing to local causes, charities, or to others in my community	4	3	2	1
I have attended a public meeting on a community issue	4	3	2	1
I have been involved in volunteer activities intended to benefit my community	4	3	2	1

27. The following items cover activities that can minimise damage and disruption in a bushfire emergency. In regard to <u>your</u> household, please record your current status for each item: (please circle one per line)

	Have done this	May do this	Will not do this
I have considered the risk of a major bushfire when deciding to live in the house that I now live in	**3**	**2**	**1**
I keep my property tidy to reduce the threat of damage by bushfire	**3**	**2**	**1**
I keep my gutters free of leaf litter	**3**	**2**	**1**
I keep shrubs and trees from growing against the house	**3**	**2**	**1**
I keep firewood stacked away from the house	**3**	**2**	**1**
I clear up dry litter from the ground	**3**	**2**	**1**
I have a basic understanding of how a bushfire attacks	**3**	**2**	**1**
I have assessed the bushfire risk to my house, such as identifying potential fire risks like timber decking	**3**	**2**	**1**
I have a household bushfire emergency plan	**3**	**2**	**1**
I have advised my family and friends of my bushfire emergency plan	**3**	**2**	**1**
I have decided who in my household should stay, and who should leave for safety if a bushfire threatens	**3**	**2**	**1**
My plan covers where my family should meet during a bushfire emergency	**3**	**2**	**1**
I have decided what documents and personal effects I would take with me if I left the house, and have stored them where I can easily reach them in an emergency	**3**	**2**	**1**
I have decided what to do with my pets and other animals should a bushfire threaten my property	**3**	**2**	**1**
I understand the impact that a power failure would have on my plans, e.g. my automatic garage door will not open	**3**	**2**	**1**
I have checked that I have adequate home and/or contents insurance	**3**	**2**	**1**
I have an emergency kit containing:			
p. torches	**3**	**2**	**1**
q. spare batteries for torch	**3**	**2**	**1**
r. candles	**3**	**2**	**1**
s. matches/lighter	**3**	**2**	**1**
t. AM/FM battery powered radio	**3**	**2**	**1**
u. Spare batteries for radio	**3**	**2**	**1**
v. First aid kit	**3**	**2**	**1**
w. Essential medication	**3**	**2**	**1**
x. Fire extinguisher	**3**	**2**	**1**
y. Fire blankets	**3**	**2**	**1**
z. Protective clothing (shoes, natural fibre clothes etc)	**3**	**2**	**1**
aa. Bottled drinking water	**3**	**2**	**1**

	Have done this	May do this	Will not do this
bb. Long-life energy food	**3**	**2**	**1**
cc. Emergency contact details	**3**	**2**	**1**
dd. List and location of valuables	**3**	**2**	**1**
I check the contents/operation of my emergency kit before the fire season, and on a monthly basis during the fire season	**3**	**2**	**1**
I have long hoses that can reach all of my house and garden	**3**	**2**	**1**
I have metal buckets for fire-fighting	**3**	**2**	**1**
I have ladders that are long enough to allow me to check the roof cavity and eaves	**3**	**2**	**1**
I have metal rakes and shovels and mops to put out sparks	**3**	**2**	**1**
I have good access to water supplies	**3**	**2**	**1**
I am aware of alternative water sources such as ponds and pools	**3**	**2**	**1**
I keep my grass mown short	**3**	**2**	**1**
I have cleared undergrowth from fences	**3**	**2**	**1**
I have checked that all roof coverings fit tightly so that there are no openings through which sparks might get blown	**3**	**2**	**1**
I have replaced missing or damaged roof tiles	**3**	**2**	**1**
I have ensured that there are no structures built of combustible materials that are attached to my house	**3**	**2**	**1**
I have screened my vents and eaves with metal fly-wire	**3**	**2**	**1**
I have planned what I will use to block my gutters	**3**	**2**	**1**
I regularly prune and clear dead material from under shrubs and trees	**3**	**2**	**1**
I have removed tree branches that overhang my house	**3**	**2**	**1**
I have screened the under-floor spaces of my house with metal fly-wire	**3**	**2**	**1**
I have fitted shutters or metal screens to my windows	**3**	**2**	**1**
I have removed mulch from close to my house	**3**	**2**	**1**
I keep the area around my house clear with paving, mowed lawn or low ground cover	**3**	**2**	**1**
I am aware of the sorts of weather that can produce bad fire days and keep an eye on weather forecasts	**3**	**2**	**1**
I try to keep aware of fire danger ratings and total fire bans	**3**	**2**	**1**
I know what I will do if a fire front is approaching	**3**	**2**	**1**

28. Thinking about what you have heard about bushfire hazards in Australia, how consistent was this information? (Please circle only one)

1 I have not heard anything
2 Consistent
3 Fairly consistent
4 Unsure
5 Fairly inconsistent
6 Inconsistent

29. Thinking about what you've heard about bushfires in the media, please rate (from 1 = very reliable to 5 = not at all reliable) how reliable the following forms of media are when discussing bushfires: (please circle one per line)

	Very reliable				Not at all reliable
Newspapers	1	2	3	4	5
Television	1	2	3	4	5
Radio	1	2	3	4	5
Internet	1	2	3	4	5
Other (Specify: _____)	1	2	3	4	5

30. How often do you find information from media reports about bushfires useful in helping you to prepare? (please circle one)

1 I haven't heard anything
2 Never
3 Sometimes
4 Unsure
5 Mostly
6 Always

Age: _____ **Gender:** 1 Male 2 Female

Do you speak a language other than English at home? YES/NO

If yes, please specify_____

Do any members of your household have reduced mobility for any reason? YES/NO

In which of the following categories is your yearly household income (before tax):

(Please circle only one)

1	$25,000 or less	4	$66,000 – 84,000

Thank you for your participation

bushfire CRC

UTAS FACULTY OF SCIENCE, ENGINEERING & TECHNOLOGY
School of Psychology

Community responses to bushfire threat: Risk perception and preparedness.

Telephone Interview Consent Form

9. I have read and understand the information sheet for this study (see page 2).

10. The reasons for the study, what it will involve, and the possible effects of the study have been explained to me.

11. I understand that an interview will be conducted with me to obtain an understanding of the factors that influence me to prepare or not prepare for bushfires. It is my understanding that the interview will take approximately 30 minutes to complete.

12. I agree that information gathered for the study may be published, provided that I cannot be identified as a participant. I also understand that while the interview will be recorded using a digital voice recorder, my anonymity will be assured, as it is not necessary to record my name or any other identifying information.

13. I understand that all research data will be stored securely at the School of Psychology, University of Tasmania (Hobart) for a period of five years, and that the recordings and data will be destroyed after five years.

14. I understand that no psychological distress or inconvenience beyond the normal experience of everyday life is expected.

15. Any questions that I have asked have been answered to my satisfaction.

16. I agree to participate in the interview session and understand that my participation is voluntary and that I may withdraw at any time without being penalised or disadvantaged in any way.

First name of participant_____(please print)

Signature of participant_____ Date:_____

Contact number_____

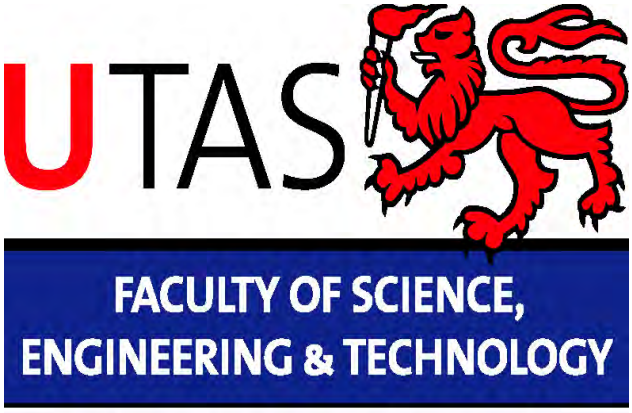
Preferred time to call (date/time) _____

Name of investigator_____

Signature of investigator_____

Date_____

NB: Between 20 and 40 telephone interviews will be conducted during the 2007/08 bushfire season. If you indicate you'd like to be contacted, but are not, this may be due to the large number of people interested in being interviewed.



School of Psychology

http://fcms.its.utas.edu.au/scieng/psychol/

Thank you very much for completing this survey.

Please remember to return this questionnaire in the reply-paid envelope within two weeks of receiving it.

If you need any more information on the questionnaire, or have any questions regarding the research, please don't hesitate to contact me:

Tim Prior
Ph: (03) 6226 7462
Email: timothy.prior@utas.edu.au

bushfire CRC

http://www.bushfirecrc.com

For information about preparing your property for the bushfire season, contact:

the Tasmania Fire Service
Toll free - 1800 000 699
www.fire.tas.gov.au

or

the NSW Rural Fire Service
Toll free - 1800 679 737
www.bushfire.nsw.gov.au

Appendix D: Sampling Locations in Hobart and Sydney (2006/07)

Hobart 2006	Hobart 2007	Sydney 2007
South Hobart	Yes	Berowra
Tolman's Hill	Yes	Davidson
Cascades	Yes	Normanhurst
Sandy Bay	Yes	West Pymbal
Fern Tree	Yes	Hornsby Ht.s
Dynnyrne	Yes	Mt. Colah
Taroona	Yes	Chatswood
Tinderbox	Yes	Wahroonga
Howrah	Yes	Middle Cove
Mt. Rumney	Yes	Heathcote
Mt. Nelson	Yes	Woronora Ht.s
Blackman's Bay	Yes	Green Point
	Bonnet Hill	Lindfield
	Lenah Valley	Killarney Ht.s
	Kingston	French's Forest
	Geilston Bay	Illawong
	Lindisfarne	Beacon Hill
	West Hobart	St. Ives Chase
	Mt. Stuart	Belrose
	Tranmere	Forestville
		Cherrybrook
		Castle Hill
		Kurrajong Ht.s
		Gordon
		Turramurra
		Willoughby
		Bonnet Bay
		Carlingford
		Pennat Hills

Appendix E: Factor Analysis of preparedness measure (See Appendices B Q31 or C Q27). Factor 1: Planning preparedness (red). Factor 2: Property preparedness (blue). Factor 3: Emergency kit (green).

Rotated Component Matrix[a]

	Component		
	1	2	3
1. RiskLive	.092	.044	.543
2. PropertyTidy	.064	.578	.332
3. Gutters	.064	.270	.484
4. ShrubsTrees	.110	.476	.000
5. Firewood	.124	.410	.134
6. Litter	.027	.653	.181
7. UnderstandingFire	.140	.025	.672
8. IdentifyRisks	.146	.235	.690
9. FireEmPlan	.242	.325	.635
10.FamKnowPlan	.284	.285	.493
11. WhoStayGo	.330	.210	.479
12.FamMeet	.328	.379	.485
13.Documents	.268	.155	.429
14.Pets	.336	.154	.322
15.PowerFailure	.265	.241	.593
16.Insurance	.080	.339	.143
17.Torch	.712	.085	.162
18.BattTorch	.669	.235	.188
19.Candle	.730	.083	.011
20.Matches	.758	.121	.043
21.Radio	.730	.198	.128
22.BattRadio	.707	.210	.144
23.FirstAid	.738	.159	.085
24.Medication	.708	.284	.048
25.Extinguish	.655	.094	.166
26.Blankets	.629	.106	.153
27.ProtCloth	.729	.114	.213
28.DrinkingWater	.723	.186	.166
29.EnergyFood	.552	.137	.105
30.EmContact	.678	.102	.170

31.LocValuables	.487	.262	.228
32.CheckKit	.663	.173	.304
33.Hoses	.228	.373	.263
34.Bucket	.409	.074	.384
35.Ladder	.046	.221	.433
36.Rake	.170	.268	.435
37.WaterSupply	.164	.329	.104
38.AltWater	.168	.162	.212
39.Mow	.180	.495	.205
40.Undergrowth	.143	.640	.207
41.RoofCover	.132	.446	.497
42.Tile	.140	.512	.081
43.CombStructures	.096	.576	.082
44.ScreenVents	.297	.353	.053
45.BlockGutters	.215	.356	.436
46.Prune	.172	.718	.198
47.Overhanging	.158	.479	.179
48.ScreenFloor	.214	.336	.149
49.Shutters	.115	.218	-.078
50.Mulch	.112	.592	.115
51.Clear	.045	.715	.050
52.Weather	.072	.066	.521
53.DangerRate	.162	.066	.521
54.FireFront	.216	.141	.599

Extraction Method: Principal Component Analysis.

Rotation Method: Quartimax with Kaiser Normalization.

a. Rotation converged in 5 iterations.

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.881
Bartlett's Test of Sphericity	Approx. Chi-Square	6162.841
	df	1431
	Sig.	.000

Appendix F: Regression weights and significance levels

Appendix F.1. Regression weight estimates and significance for paths depicted in the structural model presented in Figure 5.1

			Estimate	S.E.	C.R.	P
SoCPlace	<---	PosOutcomeExp	.073	.030	2.470	.014
SoCPlace	<---	NegOutcomeExp	-.067	.031	-2.154	.031
SoCPeople	<---	SoCPlace	.632	.060	10.540	***
SoCPeople	<---	NegOutcomeExp	-.180	.040	-4.521	***
CollProbSolve	<---	PosOutcomeExp	.082	.038	2.134	.033
CollProbSolve	<---	SoCPeople	.485	.041	11.869	***
IntentPrep3	<---	NegOutcomeExp	-.078	.018	-4.414	***
IntentPrep3	<---	SoCPlace	.085	.026	3.247	.001
IntentPrep3	<---	PosOutcomeExp	.066	.017	3.915	***
PrepInhibitors	<---	NegOutcomeExp	.834	.087	9.562	***
IntentPrep3	<---	CollProbSolve	.042	.017	2.426	.015
AllBushfirePreps3	<---	NegOutcomeExp	-.801	.263	-3.041	.002
AllBushfirePreps3	<---	PosOutcomeExp	.948	.231	4.108	***
AllBushfirePreps3	<---	SoCPlace	1.283	.358	3.586	***
AllBushfirePreps3	<---	IntentPrep3	4.670	.616	7.578	***
AllBushfirePreps3	<---	PrepInhibitors	-.781	.118	-6.600	***
AllBushfirePreps3	<---	CollProbSolve	.707	.234	3.023	.003

Appendix F.2. Regression weight estimates and significance for paths depicted in the structural model presented in Figure 5.2

			Estimate	S.E.	C.R.	P
SoCPlace	<---	PosOutcomeExp	.058	.034	1.699	.089
SoCPlace	<---	NegOutcomeExp	.018	.038	.461	.645
SoCPeople	<---	SoCPlace	.660	.074	8.959	***
SoCPeople	<---	NegOutcomeExp	-.152	.050	-3.007	.003
CollProbSolve	<---	PosOutcomeExp	.118	.050	2.352	.019
CollProbSolve	<---	SoCPeople	.507	.053	9.627	***
IntentPrep3	<---	NegOutcomeExp	-.068	.030	-2.298	.022
IntentPrep3	<---	SoCPlace	.042	.042	.995	.320
IntentPrep3	<---	PosOutcomeExp	.163	.027	6.023	***
PrepInhibitors	<---	NegOutcomeExp	.909	.093	9.723	***
IntentPrep3	<---	CollProbSolve	.077	.025	3.070	.002
AllBushfirePreps3	<---	NegOutcomeExp	-.548	.382	-1.435	.151
AllBushfirePreps3	<---	PosOutcomeExp	.769	.325	2.367	.018
AllBushfirePreps3	<---	SoCPlace	.586	.487	1.203	.229
AllBushfirePreps3	<---	IntentPrep3	5.206	.614	8.486	***
AllBushfirePreps3	<---	PrepInhibitors	-.441	.187	-2.363	.018
AllBushfirePreps3	<---	CollProbSolve	.669	.290	2.307	.021

Appendix F.3. Regression weight estimates and significance for paths depicted in the structural model presented in Figure 5.3

			Estimate	S.E.	C.R.	P	Label
SoCPlace	<---	PosOutcomeExp	.075	.047	1.603	.109	
SoCPlace	<---	NegOutcomeExp	-.082	.051	-1.611	.107	
SoCPeople	<---	SoCPlace	.458	.085	5.377	***	
SoCPeople	<---	NegOutcomeExp	-.167	.062	-2.688	.007	
CollProbSolve	<---	PosOutcomeExp	.329	.067	4.886	***	
CollProbSolve	<---	SoCPeople	.426	.074	5.774	***	
IntentPrep3	<---	NegOutcomeExp	-.188	.044	-4.249	***	
IntentPrep3	<---	SoCPlace	.094	.059	1.600	.110	
IntentPrep3	<---	PosOutcomeExp	.176	.042	4.152	***	
PrepInhibitors	<---	NegOutcomeExp	.814	.126	6.465	***	
IntentPrep3	<---	CollProbSolve	.004	.036	.122	.903	
AllBushfirePreps3	<---	NegOutcomeExp	-1.484	.529	-2.806	.005	
AllBushfirePreps3	<---	PosOutcomeExp	.687	.471	1.459	.145	
AllBushfirePreps3	<---	SoCPlace	.096	.631	.152	.879	
AllBushfirePreps3	<---	IntentPrep3	2.586	.723	3.578	***	
AllBushfirePreps3	<---	PrepInhibitors	-.414	.238	-1.736	.083	
AllBushfirePreps3	<---	CollProbSolve	.470	.388	1.209	.227	

Appendix F.4. Regression weight estimates and significance for paths depicted in the structural model presented in Figure 5.4

			Estimate	S.E.	C.R.	P	Label
SoCPlace	<---	PosOutcomeExp	.075	.047	1.603	.109	
SoCPlace	<---	NegOutcomeExp	-.082	.051	-1.611	.107	
IntentPrep3	<---	NegOutcomeExp	-.188	.044	-4.272	***	

IntentPrep3	<---	SoCPlace	.095	.058	1.634	.102
IntentPrep3	<---	PosOutcomeExp	.177	.041	4.368	***
PrepInhibitors	<---	NegOutcomeExp	.814	.126	6.465	***
AllBushfirePreps3	<---	NegOutcomeExp	-1.554	.530	-2.931	.003
AllBushfirePreps3	<---	PosOutcomeExp	.862	.455	1.894	.058
AllBushfirePreps3	<---	SoCPlace	.231	.628	.368	.713
AllBushfirePreps3	<---	IntentPrep3	2.592	.725	3.576	***
AllBushfirePreps3	<---	PrepInhibitors	-.414	.239	-1.733	.083